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USING INFORMATION TECHNOLOGY IN THE NAVY LESSONS LEARNED SYSTEM TO IMPROVE ORGANIZATIONAL LEARNING

by

Michael J. Garvey

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Thesis Advisor: Erik Jansen

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Organizations are becoming increasingly aware that learning can be a source of competitive advantage. The United States Navy is not immune to this realization and has established the Navy Lessons Learned System (NLLS) as the singular Navy program for the collection, validation, and distribution of unit feedback. NLLS provides naval personnel a means to share observations, document deficiencies, convey solutions, and innovate tactics, techniques, or procedures (TTP). The purpose of this thesis is to examine the various factors that influence organizational learning such as structure, environment, and culture and to examine how Information Technology can be used to support or enhance organizational learning in the Navy. The research concludes that NLLS has improved organizational learning but has not attained as widespread use as is possible. Recommendations are provide to improve the program and increase NLLS exposure to the fleet and to the potential users of the system.

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USING INFORMATION TECHNOLOGY IN THE NAVY LESSONS LEARNED SYSTEM TO IMPROVE ORGANIZATIONAL LEARNING

Michael J. Garvey
Lieutenant, United States Navy
B.A., Binghamton University, 1991

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Author: Michael J Garvey
Michael J. Garvey

Approved by: Erik Jansen
Erik Jansen, Thesis Advisor

Shelly P Gallup
Shelly Gallup, Associate Advisor

Dan C Boger
Dan C. Boger, Chairman
Information Systems Academic
Group

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Organizations are becoming increasingly aware that learning can be a source of competitive advantage. The United States Navy is not immune to this realization and has established the Navy Lessons Learned System (NLLS) as the singular Navy program for the collection, validation, and distribution of unit feedback. NLLS provides naval personnel a means to share observations, document deficiencies, convey solutions, and innovate tactics, techniques, or procedures (TTP). The purpose of this thesis is to examine the various factors that influence organizational learning, such as structure, environment, and culture, and to examine how Information Technology can be used to support or enhance organizational learning in the Navy. The research concludes that NLLS has improved organizational learning but has not attained as widespread use as is possible. Recommendations are provided to improve the program as well as increase NLLS exposure to the fleet and to the potential users of the system.

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I. INTRODUCTION

Chris Argyris and Donald A. Schön, in their classic book on organizational learning, define it as the process of "detection and correction of errors." In their view, organizations learn through the individuals who act as agents for them: "The individuals' learning activities in turn, are facilitated or inhibited by an ecological system of factors that may be called an organization learning system." (Argyris and Schön, 1978) George Huber expands on this, stating, "An organization learns when, through its processing of information, the range or likelihood of its potential behaviors is changed." (Huber, 1991)

Offering us a procedural definition are other noted authors, Raanan Lipshitz and Micha Popper who define a learning organization as:

> *A learning organization is an organization that institutes organization-learning mechanisms and operates them regularly. Organization Learning Mechanisms are defined as institutionalized structural and procedural arrangements that allow organizations to systematically collect, analyze, store, disseminate, and use information that is relevant to the effectiveness of the organization. (Lipshitz and Popper, 1996)*

Organizations as diverse as Motorola, BP Amoco, and the United States Army are becoming increasingly aware of the concept of organizational learning in order to acquire a competitive advantage, increase their capacity to innovate, or improve effectiveness.

With this need in mind, every day around the world naval units are involved in either real world exercises or training missions that mirror the real world. Traditionally, emphasis is placed on the preparation-through-execution phase. However, if we do not review, analyze, and disseminate the exercises and missions we have just concluded, we

lose potentially the most important aspect: the lessons learned, and with them our ability as an organization to learn. While this may seem a simple enough concept, actualizing it requires two major elements. First, a way to collect and record these valuable contributions, and second, a way to share the information throughout the organization. Without both we are destined to repeat past mistakes.

A. PURPOSE

This research evaluates the impact that the implementation of an Information Technology infrastructure has had on the potential for organizational learning through the Navy Lessons Learned System (NLLS). The purpose of this study is to explore and discuss the influence that technology, especially information technology, has had on the organizational learning process in the Navy.

The primary research objective is to explore the answer to the following question: Can the use of Information Technology in the Navy's Lessons Learned System be used to improve organizational learning? Secondary questions include: How effective is the Navy Lessons Learned System as a tool for promoting organizational learning? Is Information Technology being used effectively to analyze collected information to identify a recurring weakness in tactics, techniques, or procedures? And lastly, to what degree has Information Technology improved the process or availability of disseminating relevant information to potential users?

This research targets the information systems at the Center for Navy Lessons Learned. A secondary purpose of this thesis is to provide the Naval Warfare and

Development Center with recommendations for improving and enhancing the existing organizational learning process as evaluated against that of other learning organizations.

B. BACKGROUND

Today, in an era of declining defense dollars, the Department of Defense and the United States Navy face continually increasing pressures to reduce spending. They are responding by reducing the numbers of ships and aircraft, downsizing military personnel, and decreasing training opportunities for those who stay. To surmount the budget challenges, the military must reap the maximum benefit from the opportunities still available.

The overriding objective of the Navy's Lessons Learned program is to provide a fleet-wide benefit from operational exercises and experiences. To be successful in this endeavor, the program must create a coordinated process for capturing, securing, retrieving, and distributing the organization's knowledge.

A common phrase heard in the business world is, "If only we knew what we know, we would be twice as profitable." But why is there a need for the Navy to encourage knowledge sharing? We do not contend in the same competitive marketplaces as corporate America; nor is the United States currently at war with anyone. However, like all government organizations, today's military is competing for scarce resources and must take full advantage of the opportunities presented. Consequently, we have seen lessons learned in training exercises that often must be relearned in conflict, sometimes

with fatal results. A GAO study published in 1994 points out one such example that occurred during the recent military experience in the Persian Gulf:

> *"During Operation Desert Shield in 1990-1991, five Army protective bunker collapses caused three fatalities and three other injuries. The cause sited in a subsequent lessons learned report was that ...locally available materials were used to construct bunkers deviating from standard design." (GAO, 1994)*

In 1988 the Center for Army Lessons Learned (CALL) had reports that units at the combat training centers had difficulty in obtaining support materials for their protective bunkers, which caused them to use locally available materials. The results were "poorly constructed bunkers made of non-standard design and materials." This prompted a lessons learned report that was disseminated by CALL in 1988. Because of "inadequate follow-up and corrective action," a similar lessons learned report had to be generated in 1991, this time after a lesson with far more severe consequences. (GAO, 1994)

C. SCOPE AND METHODOLOGY

The scope of this study focuses on the use of the Navy Lessons Learned System (NLLS) as a structured method for organizational learning. The primary concentration of the study is the use of organizational learning constructs and models as a framework for comparing procedures in place at the Naval Warfare and Doctrine Command and at least one other military organization. Current IT policies are examined to ascertain if recommendations or conclusions can be made to aid in improving the existing IT

infrastructure at NLLS. The goal is to increase NLLS ability to provide the best relationship between the information system organization and the customers they support.

D. RESEARCH METHODOLOGY

The research techniques used for this thesis comprise the following steps:

1. Conduct a thorough literature search of the NLLS mission, purpose, history, and organizational structure from documents provided by the Navy Warfare Development Command.

2. Gather technical information about the IT infrastructure and collection process by conducting telephone interviews with relevant members of the organization.

3. Conduct a literature search of Naval Instructions, Naval Programs, professional journals, books, magazine articles, and other library informational resources about the Navy Lessons Learned System.

4. Conduct a literature review of different learning organizational design models to explore and discuss the uses of their key components for this application.

5. Conduct a literature review of the Center for Army Lessons Learned program to explore and discuss possible benefits or drawbacks.

6. Explore the ability of NLLS to deliver value to the user by employing emerging Information Technologies to prevent recurring weakness in training, techniques, or procedures.

7. Generate a sample-based assessment of NLLS's impact on the organization, using an appropriate survey.

E. ORGANIZATION OF STUDY

The thesis is organized as follows.

Chapter I Introduction: This chapter provides the purpose, background, and research methodology of the thesis.

Chapter II Naval Warfare and Development Command: This chapter provides background information on the organization of the Navy Warfare Development Command, history of the Navy Lesson Learned System, methodology of collection at the Fleet Management sites, and validation of inputs through interaction of the Subject Matter Experts.

Chapter III Organizational Learning Models: This chapter discusses individual learning verses organizational learning and presents the reader with several types of organizational learning models. The effect that structure, environment, and culture can have on learning is also discussed.

Chapter IV Use of Technology in a Learning Organization: This chapter will look at how to build a Learning Organization and examine the use of technology to improve Organizational Learning.

Chapter V Information Technology in Other Organizations: This chapter will provide a case study of organizational learning as it occurs in another military organization for comparison purposes.

Chapter VI Findings: The chapter will present the survey questions with a breakdown of the responses received.

Chapter VII Analysis: This chapter will conduct an analysis of the results of the survey.

Chapter VIII Conclusions and Recommendations. This chapter will provide conclusions and recommendations to improve the effectiveness of NLLS.

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II. NAVAL WARFARE DEVELOPMENT COMMAND

A. INTRODUCTION

The Naval Warfare Development Command was officially established on 10 August 1998 in Newport, Rhode Island. Its purpose is to lead warfare innovation and concept development, to design plan and coordinate the Navy's Fleet Battle Experiment program, and to represent the Navy in Joint Experimentation. NWDC charter is to synchronize, approve, and disseminate Navy doctrine.

The Navy Warfare Development Command is composed of four departments: Concepts Development, Maritime Battle Center, Doctrine, and Operations. (NWDC Public Affairs, 2000)

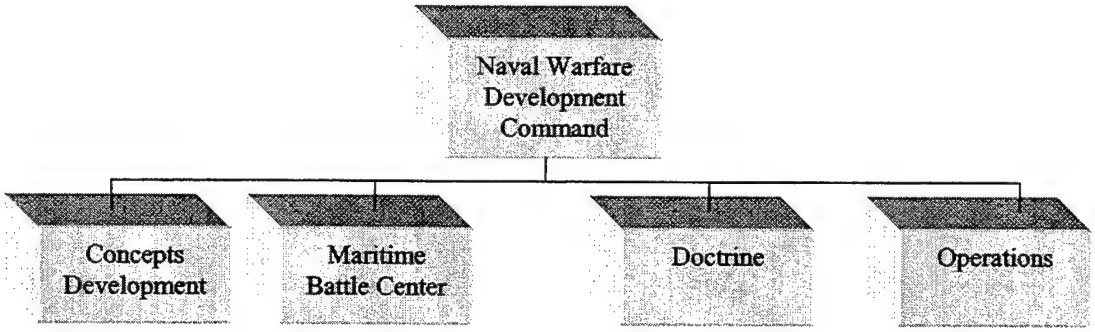

Figure 1. NWDC Organizational Chart

1. Concepts

The Concepts Department's mission is to develop Navy warfighting concepts and identify required capabilities. These concepts are then tested and refined through Fleet

Battle Experiments, war games, modeling and simulations, and other processes. The results are expected to form the basis to develop and revise Navy Doctrine.

By pooling ideas from many sources and taking the most promising ideas, Concepts can develop and identify capabilities with potential improvements to the way the Navy operates. These ideas are then validated through a fast-paced, six-month experimentation process providing for warfighting innovation. (NWDC Public Affairs, 2000)

2. Maritime Battle Center

The Maritime Battle Center (MBC) was established to serve as the single point of contact for the Navy Fleet Battle Experimentation (FBE) and participation in Joint Experiments.

The MBC is responsible for designing and planning Fleet Battle Experiments, coordinating the execution of these experiments in conjunction with the numbered fleet operational command elements, and analyzing and disseminating experiment results. The FBE results are then used to accelerate the delivery of innovative warfare capabilities to the fleet, identify concept based requirements, and evaluate new operational capabilities. (NWDC Public Affairs, 2000)

3. Doctrine

The Doctrine Department is the Navy's primary point of contact for Naval Doctrine and Joint and Combined Doctrine Development. As the Fleet agent for operational doctrine development, the NWDC Doctrine Department facilitates fleet

consensus on emerging Navy and Joint doctrinal issues. (NWDCINST 5400.1X) In addition, the Doctrine Department has the administrative and management responsibility for the Navy Warfare Publication Library and the Navy Lessons Learned System. (NWDC Public Affairs, 2000)

The primary means for the proposal, validation, and revision of Navy operational-level doctrine and inputs to Joint doctrine is through the use of a semi-annual Navy Doctrine Working Party (NDWP). The objectives of the NDWP are threefold:

- Serve as a forum for Fleet engagement on current or emerging doctrinal issues.
- Consolidate the Fleet input on topics at the subsequent Joint Doctrine Working Party.
- Validate proposals for development/revision of Navy Warfare Publications (NWP).

According to Captain Robert Nestlerode, Doctrine Department Head, proven operational concepts, validated through experimentation and collaborative development with the fleet, translate into useful doctrine. "The goal is to make the Navy's doctrine development dynamic, responsive, and interactive." (Nestlerode, 2000)

4. Operations

The Operations Department is the newest department at NWDC, established in May 1999. The purpose of the Operations Department is to provide support in the form of technical research, analysis, modeling and simulation, and "red cell," or adversary view,

of emerging concepts. In addition, the Operations Department is tasked to act as the NWDC implementation conduit to the Fleet Commanders in Chief, Numbered Fleet Commanders, Naval Systems Command, and the Integrated Warfare Requirements (IWAR) board in Washington D.C. (NWDC Public Affairs, 2000)

B. OVERVIEW OF THE NAVY LESSONS LEARNED SYSTEM

1. Navy Lessons Learned Central Site

a. History

The Navy Lessons Learned System (NLLS) was formally created in 1991 by CNO direction as a result of a growing fleet interest in providing a centrally managed and easily accessible lessons learned database. In 1995, a Congressionally ordered GAO report was released that was critical of all the services and their potential to use lessons learned as a means to avoid repetition of past mistakes. Consequently, the Chief of Naval Operations improved on this system by instituting and formalizing guidance in the form of an OPNAV instruction. Its purpose was to standardize and delineate the NLLS requirement and formal feedback process. The Navy Lessons Learned System that developed was patterned after the Joint Chiefs of Staff (JCS) sponsored Joint Universal Lessons Learned System (JULLS). This system currently makes up the formal feedback process. (NWDC Public Affairs, 2000)

b. Purpose

By definition, a lesson learned is information that contributes to the Navy's corporate body of knowledge and should produce increased process efficiency and improved execution of future operations. Additionally, it should provide value added to existing Navy policy, doctrine, tactics, techniques, procedures, training, systems or equipment. (CINCPACFLTINST 3500.37A)

The objective of NLLS is to provide for a Navy-wide standardized procedure for collection, validation, and distribution of lessons learned from fleet exercises and everyday operations. This provides Naval activities with a formally managed database of current information that has been validated by either platform or warfare experts in support of fleet operations. The lessons learned are submitted through the use of the Navy Instruction Input Program (NIIP) to the applicable commands operational Immediate Superior in Command (ISIC). There, they are checked for applicability and redundancy before being sent on to one of five Fleet Management Sites for validation and inclusion in the database.

c. Structure

The Navy Lessons Learned Central site is assigned under the Naval Warfare Development Command (NWDC) Doctrine department and serves as the centralized data collection, management, and distribution center for all NLLS inputs. The Central Site also is tasked to act as the Program Director and Administrator for NLLS, as well as provide for the quality assurance of the Navy Lessons Learned Data Base

(NLLSDB), and distribution of the product to fleet units. Contractor support at NWDC consolidates Lessons Learned, Port Visit Reports, and After Action Reports, insuring that they are in the proper format before releasing the data as part of the NLLSDB via a Secure Internet Protocol Router Network (SIPRNET) Web site and a quarterly CD-ROM set.

2. Fleet Management Sites

a. Purpose

Fleet Management Sites (FMS) are responsible for the collection, processing, and validating of lessons learned submitted from their area of responsibility (AOR). By supplying the approval on each submission, each fleet CINC establishes control over the quality and validity of the lessons learned in his area before it is submitted to the central site for inclusion into the NLLDB.

b. Structure

When a fleet user submits a lesson learned, it is sent to one of five Fleet Management Sites, depending on the originator's theater of operations. These sites are located with the numbered fleet commanders and are each manned by a civilian contractor senior data analyst. It is this analyst, with the help of a variety of subject matter experts (SMEs), who is responsible for the processing and validation of the lessons learned submitted by his or her subordinate commands.

The Fleet Management Sites are also responsible for overseeing the Remedial Action Program for their areas and ensuring NLLS training is conducted aboard each deploying command. Additionally, they conduct an annual review to verify the currency and quality of the database at the central site. (OPNAV3500.37B)

3. Analysis and Validation

a. Subject Matter Experts

Subject Matter Experts (SMEs) are personnel in major commands, warfare centers, or tactical development centers who are recognized for having extensive knowledge and experience in a particular warfare area of operation (OPNAVINST 3500.37B). SMEs provide the theater commanders support by reviewing and validating Lessons Learned and Remedial Action Program issues as required. For example, a lesson learned submission on Battle Group tactics in the Atlantic would go to the SMEs located at Tactical Training Group Atlantic for review, consideration, and validation. If it concerned employment of a Carrier Air Wing, it would go to the Naval Strike and Air Warfare Center.

b. Remedial Action Program

A Remedial Action Program (RAP) item is defined as a deficiency or shortcoming in existing policy, organization, training, education, equipment, or doctrine that requires actions to correct. (OPNAVINST 3500.37B) If a lesson learned submission meets this criterion, the Fleet Management Site will assign a RAP Working Group to this

item. The Management site is responsible for tracking and updating the NLLDB on the status of the remedial action. If an item cannot be resolved at the Management Site Level, the item will be forwarded to a CNO Executive Panel. Once the item is accepted, the CNO panel is responsible for tracking the action taken, but it is still the Management Site's responsibility to update the item in the NLLDB. If the CNO Executive Panel rejects the item, the Management Site will note the reason in the database and cancel the project as appropriate. (OPNAVINST 3500.37B)

Tactical or procedural deficiencies will be forwarded to Tactical Development and Evaluation (TAC D&E) Steering Committees for consideration. Approved considerations will be developed into new Tactics, Techniques or Procedures for inclusion into the Navy Warfare Publications (NWP) system.

C. SUBMISSION, PUBLICATION, AND DISTRIBUTION

A Fleet User will submit a Lesson Learned (LL) by means of a Navy Instructional Input Program (NIIP) message to the Immediate Supervisor In Command (ISIC). The ISIC will review the LL for accuracy and forward it to the theater's NLLS Management Site. The NLLS Management Sites are located as follows:

CINCLANTFLT NLLS Management Site, Norfolk, Virginia

CINCPACTFLT NLLS Management Site, San Diego, California

COMUSNAVCENT NLLS Management Site, Tampa, Florida

COMSIXTHFLT NLLS Management Site, Gaeta, Italy

COMSEVENTHFLT NLLS Management Site, Yokosuka, Japan

At each Fleet Management Site (FMS) the NLLS Data Analyst has the lesson learned validated by Navy Staff personnel or Subject Matter Experts. Once validated, the FMS will make certain that the Lesson Learned Submission / Summary Report is in the proper format. He will then assign appropriate keywords and ensure the comments section uses standardized terminology.

The validated lesson learned is forwarded to the NLLS Central Site at the Naval Warfare Development Command in Newport, RI, for final processing and uploading to the Lessons Learned SIPRNET Web Site. Along with the weekly Web site update, the lessons learned database is distributed quarterly on a NLLS two-volume CD-ROM.

Lessons learned will remain in the active database until it is determined by the theater CINC or SMEs that they are no longer valid, have been corrected, or are no longer relevant to current Navy procedure. At that point, but not later than two years from the entry date, the lesson learned will be moved to the inactive database.

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III. ORGANIZATIONAL LEARNING MODEL

A. INTRODUCTION

Organizations continually strive for improved systems of information collection, management, and analysis. The introduction of and rapid advancements in availability of computers during the last 30 years have resulted in more evolved systems for acquiring, storing, and disseminating information. The opportunities presented by these advances have produced widely varying benefits for organizations seeking to increase stakeholder value. This identification of knowledge as a means for competitive advantage has meant an exponential demand for information systems. Worldwide expenditures on information technology have generated significant but somewhat varying benefits to those companies who invest in information technology for knowledge benefits. (Drucker, 1994) This explosion of data often threatens to overwhelm individuals with information. Advances have focused on making us masters of gathering data, but not on turning that data into knowledge.

Companies today gather increasing amounts of information, much of it of debatable utility. All too often the question asked is, "What data do you want to gather?" instead of, "What do you plan on doing with it?" Advances in computer systems have made gathering and storing data simple. The problem now is finding and understanding the information that resides in these huge data warehouses.

Thomas Davenport of Anderson Consulting gives a good example of this data-to-knowledge deficit. He writes that the CIO of a grocery chain highly regarded for its use

of IT once confided to him that his company analyzed at most only two percent of the data it collected. Another example Davenport cites is that of a midwestern grocery chain that finally decided to throw away its scanner data. The data "had been saved for years in the hope that it would someday be analyzed, but it never was." (Davenport, 1999)

The challenge facing today's IT people is not to provide technology or record data, but to help the organization make use of this information.

B. DATA VS. KNOWLEDGE

Quality information is as critical a resource in the military as the ships we serve on. But what exactly is information, and what separates quality information from data? Do we know what kind of information we need, and, if so, how do we recognize, capture, and then pass it on to others?

As simple as it may seem, it is important to understand that data, information, and knowledge are not interchangeable. Understanding the difference between the three and what you can and can't get from each can mean the difference between success and failure in individual or organizational learning.

1. Data

Data can be defined as a set of discrete, objective facts about events (Davenport, 1999). In the organizational context, it is most often described as a structured record of transactions. The example Davenport gives involves a trip to the local gas station. The receipt that prints out after the customer fills the tank consists of data: how many gallons the customer bought, how much he paid for each gallon, and when he bought the gas. The

data by itself tells the reader nothing about why the customer chose that particular gas station over another, when or will he come back again, or how well or poorly that gas station is managed. (Davenport, 1999)

Data by itself can be evaluated in two ways, quantitatively and qualitatively. Quantitative measures would include how much the data costs to capture, or how long it takes the system to call up the data. Qualitative measures would include "timeliness, relevance, and clarity." (Davenport, 1999) Do we have access to it when we need it, is it what we need, and can we make any sense out of it?

Data collecting has become increasingly efficient in many organizations. But the problem with becoming a data culture is twofold: First, the more data you collect the harder it is to make sense out of it; and second, there is no inherent meaning in data. Data by itself tells only part of the story.

2. Information

One definition of information is "data that has been put into a meaningful and useful context and communicated to a recipient who uses it to make decisions." (Burch and Grudnitski, 1986) Information must inform and, as with the transfer of any message, information has to have a sender and a receiver. In information, it is the receiver who decides what is really information. "A memo of unconnected ramblings may be information to the sender but to the receiver it is just noise." (Davenport, 1999)

Like data, information can be evaluated in quantitative and qualitative measures. Quantitative measures would include how many messages we sent out or how much e-

mail we downloaded. Qualitative measures would include whether those messages provided any useful advice on how we should do our jobs today, or helped us arrive at solutions for a particular problem.

Davenport contends that data becomes information when its creator adds meaning or adds value in various ways, the most important of which all which begin with the letter C. They are:

- *Contextualized*: Knowing for what purpose it was gathered.
- *Categorized*: Establishing the units of analysis or key components of the data.
- *Calculated*: Analyzing the data mathematically or statistically.
- *Corrected*: Removing errors from the data.
- *Condensed*: Summarizing the data in a more concise form.

A list of sports scores in a newspaper is an example of data. When the list is framed as one team defeating another, information results. As Peter Drucker said, "Information is data endowed with relevance and purpose." (Drucker, 1992) Sports scores are only data, but when a reader sees the win or loss of a favorite team, he has information.

3. Knowledge

This, however, is still only information. To gain knowledge, one must know how to use this information – or in this case, understand how the game is played. Someone who did not understand the rules of golf, for example, might think that the player with a score of 83 did better than the player with a score of 72. But if he is able to understand

and internalize the information, and know that in golf the lowest score wins, then he can use this information to gain knowledge of the tournament being played.

On a larger scale Davenport defines knowledge in this way:

> *Knowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms. (Davenport, 1999)*

Just what characterizes knowledge, then, is not so easy to identify. Following the chain we set up earlier, we can see that knowledge is derived from information, as information was derived from data. But where data consists of a computer printout, or information a newspaper sports page, knowledge resides in the minds of individual.

C. ORGANIZATIONAL LEARNING

1. Individual Learning

In order to discuss organizational learning theories, we first must discuss the role of the individual in that learning. M. J. Marquardt points out that "individual learning is needed for organizational learning since individuals form the units of groups and organizations." Also emphasizing the role of the individual is Peter Senge, who writes, "Organizations learn only through individuals who learn. Individual learning does not guarantee organizational learning, but without it no organizational learning occurs." (Senge, 1990)

Placing somewhat less importance on the role of the individual in organizational learning is D. H. Kim, who argues, "Organizational learning is much more complex and dynamic than a mere magnification of individual learning. ... The level of complexity increases tremendously when we go from a single individual to a large collection of diverse individuals." (Kim, 1993)

Regardless of where these authors stand on the continuum of the importance of individual learning in organizational learning, they are in general agreement that individual learning is the starting point for organizational learning to take place. Without it, organizations as entities would be unable to learn on their own.

2. Organizational Learning

Organizational Learning is a concept that has gained widespread interest in both the business and academic communities. From the business side, the writings focus on paying attention to the concept of organizational learning in order to provide a sustainable advantage over corporate competitors. In the academic community, the writings take a procedural approach, looking at "detecting and correcting errors" or "encoding inferences from history into routines that guide behaviors." (Argyris and Schön, 1978; Levitt and March, 1988) Though they come at it from slightly different perspectives, both groups would agree that organizational learning makes an organization more effective, profitable, and adaptable to change. Because of this, the organization should ensure processes are in place that allow individual and organizational alike to learn.

The military is not oblivious to this realization and, in fact, takes great pains to improve on detection and correction of errors. Still, organizational learning is the result of a wide range of factors and influences that include structure, environment, culture, and technology. The purpose of reviewing different organizational learning models is to identify those factors that may have significance to a military organization. As General Gordon R. Sullivan (U.S. Army) said:

> *"Our task is not to make perfect plans...our task is to create organizations that are significantly flexible and versatile that they can take our imperfect plans and make them work in execution" (Sullivan and Harper, 1996)*

3. Goals of NLLS Organizational Learning

The goal of the Navy Lessons Learned System is an effort by the organization to promote Navy-wide learning through the collection and dissemination of all significant lessons learned, summary reports, and port visit reports, culled from the day-to-day maritime operations that are routinely undertaken. The Navy Lessons Learned System is designed to be the singular Navy Program for the collection, validation, and distribution of unit feedback as well as for the correction of problems identified from fleet operations. (OPNAVINST 3500.37B) The goal of the system is to promote organizational learning by ensuring we learn lessons once.

D. TYPES OF ORGANIZATIONAL LEARNING

In this thesis I focus primarily on the Models of Organizational Learning presented by George Huber and by Chris Argyris and Donald Schön. Huber views organizational learning from a systems perspective primarily concerned with the

acquisition, distribution, and interpretation of information from the environment. Much of his writing emphasizes the need for the organization to provide conduits for the distribution of information. Argyris and Schön place greater emphasis on the individual. They contend that the way to change organizations is to change the way individuals respond to detecting and correcting errors.

1. Huber's Organizational Learning Model

In his literature review on organizational learning, Huber describes the following four processes, or constructs, that contribute to organizational learning.

a. Knowledge Acquisition

Learning occurs when an organization acquires knowledge. This knowledge can be acquired intentionally by such means as organizational experiments, which result in focused learning, or unintentionally and unsystematically, which results in "haphazard or multi faceted" learning. (Huber, 1991) If the organization facilitates experimental learning, the focus should be on increasing the accuracy of feedback generated. Also, increased emphasis should be placed on determining the cause and effect relationships between actions and outcomes.

Other methods of knowledge acquisition include "scanning the environment" for knowledge or facts, using information systems to store, administer, and retrieve this information, and the grafting of new members who "possess knowledge not previously available within the organization." (Huber, 1991)

b. Information Distribution

According to Huber, Information Distribution is a determinant of both the "occurrence and breadth" of organizational learning. (Huber, 1991) This distribution is the process by which an organization shares information among its members, thereby promoting knowledge. The more widely information is distributed in the organization, the more varied sources for it to continue to exist, thus making retrieval efforts more likely to be successful. Brown and Duguid concur with this, stating that a majority of learning takes place in informal "communities of practice" by members sharing stories or anecdotes of work. The greater the sharing or distribution of information within the entity, the greater the organizational learning that takes place. (Brown and Duguid, 1991)

c. Information Interpretation

Although information has been distributed throughout the organization, the intended receivers still must interpret it. Factors affecting the interpretation of information include the receiver's cognitive map, or frame of reference. Researchers have established that cognitive maps can vary greatly across units within the organization. (Walker, 1985; Kennedy, 1983 et al) Because belief structures are automatically applied to any incoming information, understanding this interaction between cognitive maps and message interpretation is important to understanding how organizations learn.

To aid in this information interpretation, the greater the media richness, the greater the possibility that the meaning intended by the sender will be realized by the receiver (Huber, 1991). Still, the distribution and media richness must be tempered,

because interpretation across organizational units is diminished if the amount of information exceeds the units' capacity to process it. Information overload will likely result, with filters being applied and little or no information being processed.

d. Organizational Memory

Organizational Memory refers to the way an organization stores its information. It can be hard information, which is stored in standard operating procedures, routines, and scripts, or it can be soft information, which is corporate knowledge, experiences, or practices. For an organization to learn, it is necessary that its members be able to access the information stored or possessed by other members. The greater the specialization or departmentalization of an organization, the greater the chance members will not know what other members know. In order for an organization to demonstrate learning, learned behavior must first be stored in memory and then brought forth from memory. Having the information tucked away and inaccessible will discourage or defeat learning from taking place. (Huber, 1991)

2. Argyris and Schön's Organizational Learning Model

In their book, *Organizational Learning: A Theory of Action Perspective*, Chris Argyris and Donald Schön make a connection between the learning of the individual and the learning of the organization. They say the way to change organizations is primarily through changing individual actions. This book introduced the concepts of single, double, and deutero learning, to describe the way organizations learn by the detection and correction of errors.

a. Single Loop Learning

As each member is assimilated into an organization he or she is indoctrinated through a process of socialization to a rule-governed behavior appropriate to the organization. As members carry out the practices common to the organization, they manifest a kind of knowledge. (Argyris and Schön, 1978) This reveals itself in each member as his or her own image, or map, of the organization. Taken as a whole, this results in organizational maps that are the shared description of the organization individuals have constructed. This shared description, or map, can include standard operating procedures, work flow diagrams, and any "actual patterns of activity" that are "guides to future action." (Argyris and Schön, 1978)

At times there are inputs to individual members that run counter to organizational norms. When there is a mismatch of expectation (detection of error), members seek to align activities to bring expectations back into norm (correction of errors). This is an example of single loop learning:

> *Members of the organization respond to changes in the internal and external environments of the organization by detecting errors that they then correct so as to maintain the central features of the organization. (Argyris and Schön, 1978)*

Single loop organizational learning occurs when errors are detected and corrected, but the underlying norms and polices of the organization remain unchanged. Argyris and Schön's example is that of a thermostat. When the temperature drops below a certain set value, the heater turns on. The thermostat makes no attempt to discover why the temperature has fallen below the prescribed norm.

b. Double Loop Learning

Single loop learning works well when the organization is concerned primarily with achieving existing goals, but there are many cases when error correction requires that organizational norms themselves be modified. (Argyris and Schön, 1978) This higher learning requires an organization to understand its environment in order to increase the range of options available. For members to simply keep on doing what they already know, but better, is not enough to correct the error. In double loop learning, in addition to the detection and correction of errors, the organization is actively involved in the "significant restructuring and configuration of corporate norms." (Argyris and Schön, 1978)

> *Double loop learning is those sorts of organizational inquiries that resolve incompatible organizational norms by setting new priorities and weighting of norms, or by restructuring the norms themselves together with associated strategies and assumptions. (Argyris and Schön, 1978)*

Double loop learning would occur if the thermostat could determine that the temperature dropped because the window is open, and then close it.

c. Deutero-Learning

It has become apparent to many organizations that even changing the underlying norms when a mismatch occurs is not enough. In order for a company to be continually innovative, it needs to learn how to carry out single and double loop learning. This type of "learning how to learn" is called deutero-learning or second-order learning. (Argyris and Schön, 1978)

When a company engages in deutero-learning, it discovers what occurred to facilitate or inhibit learning and invents new strategies for learning. (Argyris and Schön, 1978)

In single loop learning, individuals are concerned with the effectiveness of existing norms and procedures without questioning underlying procedures. In double loop learning, they follow error detection by questioning the organizational norms themselves for error correction. If the organization becomes concerned with discovering how it learns, then it is engaged in deutero-learning.

E. INFLUENCES ON ORGANIZATIONAL LEARNING

The previous sections highlighted two views on organizational learning. Though slightly different in their focus, they addressed the topic from a perspective that the learning of an organization was based either in part or in whole on the knowledge or actions of the individuals as an aggregate. While the individual is certainly in the forefront, Marlene Fiol and Marjorie Lyles inform us there are other factors, such as the structure, environment, and culture, that influence the probability that learning takes place.

1. Structure

According to Fiol and Lyles, a centralized mechanistic structure tends to reinforce past behaviors. A mechanistic organization is thus only capable of Argyris and Schön's single loop learning. However, an organic, more decentralized structure promotes the shifts of beliefs and actions that allow for double loop learning. (Fiol and Lyles, 1985) To

encourage learning, management must therefore move away from mechanistic structures that encourage conformance to existing norms toward the organic, flexible structures that encourage reflective action-taking. (Fiol and Lyles, 1985)

2. Environment

While Fiol and Lyles acknowledge there is some disagreement over the different viewpoints on Organizational Learning, they point out that there is much more consensus on the importance of the environment to the organization. The "ultimate aim of the organization" is long-term survival, and to accomplish this "companies align with their environment" to remain competitive and innovative. This alignment implies that the firm must have the potential to learn, unlearn, or relearn based on its past behaviors. (Fiol and Lyles, 1985)

This learning is conditional, however. If the internal or external environment is too complex for the organization to handle, no learning will take place. In order to learn, there must be both "change and stability." Too much stability causes the organization to be static or dysfunctional. Too much change and the organization is unable to map the environment. Learning requires a balance between uncertainty and constancy. (Fiol and Lyles, 1985)

3. Culture

Culture can be defined as an organization's values, beliefs, and norms, manifested as symbols, rituals, and language. Thus, culture will influence organizational action-taking. (Fiol and Lyles, 1985) It is these norms, or established patterns of behavior, that

can encourage or inhibit learning and partially determine strategy and the direction of organizational change. Changing the capacity of an organization to learn thus often involves the changing or restructuring of the norms and belief systems.

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IV. USE OF TECHNOLOGY IN A LEARNING ORGANIZATION

A. INTRODUCTION

Each day we are presented with the latest and greatest advances in information technology, and all are being publicized as critical to an organization. Brand new technologies such as data mining, intranets, video conferencing, and distance learning are being pushed as solutions for the challenges we face as we leave the Information Age and enter the Knowledge Age.

Today, the Internet presents us with almost limitless capabilities. E-mail, discussion groups, and database searching are just a few uses of the technology. The ability to reach almost anyone, at any time, presents us with an extraordinary opportunity to expand the organization's learning potential.

Still, not all technical experts and academic scholars are in agreement on the benefits realized from the increasing amounts of investment in Information Technology. Karl Sveiby contends that the confusion between knowledge and information has caused managers to sink billions of dollars in information technology ventures that have yielded marginal results. (Sveiby, 1997) Erik Brnjolfsson, a professor of Information Systems at MIT Sloan School, notes in Information Week: "The same dollar spent on the same system may give competitive advantage to one company but only expensive paperweights to another." (Sept 9, 1996)

In this chapter we will look at the emerging issue: How can organizations use Information Technology to support a Learning Organization and improve organizational performance?

B. BUILDING A LEARNING ORGANIZATION

The 1990s have been characterized by a growing interest in the learning process. This has been caused by a widespread belief that learning and innovation are essential for an organization to survive. As a consequence of a rapidly changing environment, organizations are "going out of business everyday because they have failed to adapt to change or they have adapted too slowly." (Ackoff, 1981) R. L. Ackoff, among others, believes that businesses that fail to become learning organizations will not survive. Echoing these thoughts is Peter Senge, who remarks, "The rate at which organizations learn may become the only sustainable source of competitive advantage." (Senge, 1990)

Though the military does not have to worry about going out of business, the lessons of Ackoff and Senge are more relevant than one would first think. There is a common axiom that the militaries of the world adopt doctrine to re-fight and win the last war. For example, the French built the Maginot Line to stop a German offensive based on correcting deficiencies of trench warfare identified in the latter days of WWI. Iraq built vast static defensive positions to counter mechanized coalition forces in Operation Desert Storm as a result of earlier success against waves of dismounted Iranian Infantry. Also, the United States Army's attempts to overthrow Adid in Somalia were based on tactics developed in Vietnam to fight a guerrilla force, not on the Clan relationship that actually

existed. There is no greater rapidly changing environment than war, and the price of *failure to adapt* can mean the loss of life. Taking Ackoff's words to heart, we will look at what comprises a Learning Organization and how we can introduce organizationional learning into our organization.

Before we move onto the process of building a learning organization, we must first define what a learning organization is and how it differs from organizational learning. David Garvin, noting that although "surprisingly, a clear definition of a learning organization has proved elusive over the years," gives us perhaps the most comprehensible definition:

> *A learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and modifying its behavior to reflect new knowledge and insights. (Garvin, 1993)*

It is worth noting that some of the published literature uses the terms Learning Organization and Organizational Learning interchangeably. For our purposes, we will follow Michael Marquardt's argument that there is a distinct difference between the two and that it can best be explained as a "process" vs. "product" argument. The learning organization is the desired end product. Organizational Learning is the cognitive process required to raise the capacity of the total organization towards that result. (Marquardt, 1996)

1. Five Building Blocks Of A Learning Organization

Garvin believes that a learning organization has members experienced at five main activities. They are: systematic problem solving, experimentation with new

approaches, learning from their own experience and past history, learning from experiences and best practices of others, and transferring knowledge quickly and efficiently throughout the organization. (Garvin, 1993) We will look at these individually to see if and how they relate to the Navy and the Navy Lessons Learned System.

a. Systemic Problem Solving

Systemic problem solving entails an organization's use of scientific methods for diagnosing problems, rather than guesswork. By using simple statistical tools, such as histograms and Pareto charts, organization members will be using data instead of their own assumptions to make decisions. The idea behind this is to get organizations to continually ask themselves, "How do we know that is true?" A common phrase in the military is, "That's close enough for government work." But if learning is to take place, we cannot be satisfied until we are certain that we have looked for the best answer. (Garvin, 1993)

b. Experimentation

Experimentation is described as "the systematic searching for and testing of new knowledge." (Garvin, 1993) Testing new knowledge differs from problem solving in the fact that it is not seeking to find solutions for current problems. Instead, it is motivated by the desire to expand the horizon. Experimentation for Garvin takes two main forms:

- *Ongoing Programs* that are a continuing series of small experiments designed to produce incremental gains in knowledge.

- *Demonstration Projects* that are more complex and involve holistic system changes introduced at a single site that have the goal of developing new organizational capabilities.

Experimentation in the Navy is an active and ongoing concept. A major source of this takes place at the Maritime Battle Center at the Naval Warfare Development Command in the form of Fleet Battle Experiments (FBE). A FBE is designed as an experiment, not an exercise. Its goal is to provide new doctrine or new insights into emerging technology in an operational environment. This will in turn generate ideas for further warfare concepts, or subsequent FBEs. (NWDC Public Affairs, 2000)

c. Learning From Past Experience

Companies must review their past successes and failures and systematically assess them. Lessons must be recorded in an easily available form so employees have access to them. (Garvin, 1993)

Garvin cites the example of Boeing's work to overcome the design and production problems it experienced with the 737 and 747 by going back and comparing that process with the development process of the 707 and 727, two of the companies most profitable planes. A three-year study resulted in a one-inch thick book of lessons learned and recommendations. Several members of this team were then transferred to the 767 start up, where they produced the most "successful, error free launch in Boeing's history." (Garvin, 1993)

British Petroleum takes the learning process a step further. The company has established a post-project appraisal unit that reviews major projects, writes up case studies, and derives lessons that are then incorporated into the organization's planning guidance. The bulk of this unit's time is spent in the field interviewing managers for their analysis. (Garvin, 1993)

This part of Garvin's Learning Organization most closely resembles the Navy Lessons Learned System, with a couple of exceptions. Unlike the Boeing example, the Navy Lessons Learned System does not currently do a trend analysis on the data. Second, where BP has an active collection process, the Navy relies on a passive input system for collection.

d. Learning From Others

Learning from others entails looking outside one's own immediate environment. The idea is that the observations of other companies can at times serve as a catalyst for new thinking within your own organization. The commonly accepted term is "benchmarking," an "ongoing investigation and learning experience that ensures that the best industry practices are uncovered, analyzed, adopted, and implemented." (Garvin, 1993) Still another way of securing an outside opinion is getting feedback from your customers or observing them actively using your product.

While the relevance of these ideas to the military may be seem debatable, the idea behind them is not. In order to learn, an organization has to be receptive to new ideas. By being less defensive when criticism is offered, we allow new ideas to surface.

e. Transferring Knowledge

In order to learn, the sharing of ideas and knowledge must be done quickly and efficiently throughout the organization. (Garvin, 1993) As a means of accomplishing this, Garvin lists a number of available methods, each with its own strength and weakness.

Perhaps the easiest and most prevalent means of sharing is through the use of reports or tours. Garvin believes, however, that despite their popularity, reports and tours are a cumbersome way of transferring knowledge. Trying to absorb facts from a written report or from seeing a complex concept demonstrated is fairly difficult. It is much easier and more effective to actively experience it. From this observation, Garvin notes that personnel rotation programs are one of the most powerful methods of transferring knowledge. (Garvin, 1993) When expertise is held locally, those people who are fortunate enough to have daily contact benefit tremendously. By transferring the expert to different parts of the organization, companies are able to spread the knowledge around.

Another extremely effective method of transferring knowledge is through the use of education and training programs that focus on problem solving. To be effective, the organization must follow through and ensure that this training is tied directly to implementation. (Garvin, 1993) In addition, the use of problem solving techniques can be increased if employees feel that their ideas will be listened to. One way of doing this is through the establishment of an awards system. When employees know that their ideas are being evaluated and that they have buy-in from the top, the

organization will have greater success in implementing new ideas and changing the entrenched status quo.

C. MEASURING LEARNING

Attempts to measure learning can trace their roots back to the early part of the 20th century when businesses noticed that production costs typically fell with a corresponding increase in cumulative volume. This soon became known as the learning curve. Learning curves in the 80 to 85 percent range of their projected level were not uncommon. (Garvin, 1993)

For organizations trying to measure learning, however, these curves are incomplete. They focus on a single output, such as price, and do not address other values, such as quality or new product introductions. (Garvin, 1993) In order to measure learning, a new framework had to be developed.

To track this progress, Garvin believes that organizational learning usually proceeds through three overlapping and measurable stages:

- *Cognitive Stage: Members of the organization are exposed to new ideas and begin to think differently.*
- *Behavioral Stage: Employees begin to internalize new insights and alter their behavior.*
- *Performance Improvement Stage: Changes in behavior lead to measurable improvements in results.*

At the cognitive level, surveys and questionnaires are used to test the depth of understanding and to see if some of the meanings or terms are still unclear. (Garvin, 1993)

To evaluate changes in behavior, in addition to the surveys, direct observation must be made of the employees in action. This can been done by implementing quality control recordings of phone calls, placing orders to customer service desks, or by use of "mystery shoppers" to sample the product at particular stores.

Finally, a comprehensive learning audit is undertaken to measure and assess the cognitive, behavioral, and performance changes to ensure the efforts have produced results. (Garvin, 1993)

D. STEPS TOWARDS BECOMING A LEARNING ORGANIZATION

Transforming an organization into a learning organization is not an easy undertaking. It requires a commitment from everyone involved, and the results may be slow in presenting themselves. Still, there are a number of concepts the organization can embrace immediately to expedite the process.

The first step is to foster an environment that is conducive to learning. The organization should allow time for reflection and analysis. When members are not "harried or rushed," they will have time to identify cause and effect relationships, or assess current work systems, and learning will occur. (Garvin, 1993)

The creation of learning forums, which are programs or events designed with explicit goals in mind, is another step. (Garvin, 1993) Asking provocative questions,

talking to customers, suppliers, or outside experts can open up the organization to new ideas. Turning to non-traditional sources for information or seeking opinions from people one would not normally consult can help generate new ideas. Division officers can seek input from members who work for them, asking them to come up with a different way of doing business. Anyone who hears the phrase "but that's the way it's always been done" should immediately question its validity. By employing a critical systematic thinking process, members of the organization can identify previously held assumptions and provoke feedback loops, which will provide and encourage learning.

The last and most important step is to open up information flows. "Boundaries inhibit the flow of information," and knowledge gained during routine operations will become compartmentalized, thereby reinforcing preconceived conceptions or habits. (Garvin, 1993) Opening flows can be done in a number of ways. Regularly scheduled conferences, meetings, or teams that are designed to cross levels in the organization are just a few. The greatest tools to cross platforms and connect people are the rapidly increasing capabilities of Information Technology, which can be used to generate, capture, and share knowledge throughout the organization.

E. SUMMARY

This chapter provides a frame of reference in which to understand the processes that make up organizational learning and some general concepts and definitions that will be used in later analysis. The importance of the individual as a basis for organizational learning was explored and discussed, as were several methods of acquiring knowledge.

Equal importance was given to external factors that are critical in understanding how the organization learns. Structure, environment, and culture all affect the individual's frame of reference and the range of potential behaviors that may result.

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V. INFORMATION TECHNOLOGY IN OTHER ORGANIZATIONS: THE CENTER FOR ARMY LESSONS LEARNED AND HAITI, A CASE STUDY

A. INTRODUCTION

It has been shown that organizational learning occurs when the knowledge and experience that reside in the organization's members are shared throughout the establishment. In order for learning to occur in this way, however, the organization relies on its people and groups to be agents for this transfer of knowledge. As the organization matures, this knowledge is built into the culture, structure, and memory of the organization so that even though people leave the organization, the knowledge remains.

Organizations do not have to rely solely on their members' interactions with one another for sharing to occur. They can enhance this transfer of knowledge through the use of Information Technologies.

IT's increasingly widespread usage can contribute to the growth of organizational knowledge in two ways. First, it furnishes an extremely efficient way to collect the information that resides in its members, even those who reside in its farthest node. Second, it provides the members with an easily accessible means of retrieval of this information through the use of Internet and intranets, distributed databases, or knowledge portals. Storing the organization's knowledge base using IT systems gives the added benefit of rapid modification of information as needed. For comparison to the Navy Lessons Learned System, we will look at another organization, the Center for Army Lessons Learned (CALL). Particular emphasis will be placed on CALL's efforts to

implement Information Technology in order to become a more effective learning organization.

B. HISTORY

Like the Navy, in the mid 1980s the Army leadership realized that despite the investment in the National Training Center (NTC), there was no method to capture the lessons learned from training centers in the Mojave Desert. (CALL, 97-13) In order to accomplish this, in 1985 the Army created the Center for Army Lessons Learned (CALL). CALL's initial focus was on the continental United States (CONUS) units as they rotated through NTC's desert training. Today CALL operates collections centers at the Joint Readiness Training Center (JRTC) for light forces at Fort Polk, LA, the Combat Maneuver Training Center (CMTC) at Hohenfels, GE, and the Battle Command Training Program (BCTP) at Fort Leavenworth, KS.

C. PROCESS

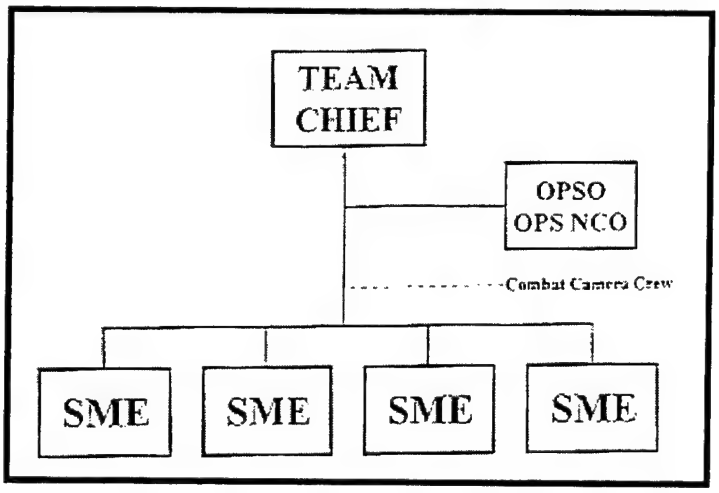
The CALL staffs are continually looking out to identify events that are indicative of new or future missions in the Army. These events will then be candidates for a Combined Arms Assessment Team (CAAT), who will be used to gather data for lessons learned and organizational knowledge gained.

Of particular recent interest to CALL were the contingency peacekeeping operations that have sprung up. Haiti was a prime example. By sending a team of experts to observe firsthand the new situations, CALL hoped to document and develop problem-

solving strategies on the spot. (Henderson, 1998) Of particular note, historically CALL's approach was to widely deploy observation teams with little effort to define learning objectives. "This strategy resulted in the collection of massive amounts of raw data that overloaded the Army's capacity to turn it into useful information." (Henderson, 1998) Today, CALL selects events for observation that it feels has a "high potential" for providing data with significant value.

Once an event has been selected, and prior to deployment, each CAAT team member will be trained as a "directed telescope" and provided a detailed set of questions about events they are to observe in the field. (Henderson, 1998) This helps to keep team members focused and provides a structure for the events they are observing. Collection personnel deploy with sufficient equipment and supplies that allow them to electronically pass observations and data back to CALL using digital equipment. This also allows team members to log on to the CALL database while in the field to access previous lessons learned information. (CALL, 97-13).

D. COLLECTION TEAM ORGANIZATION



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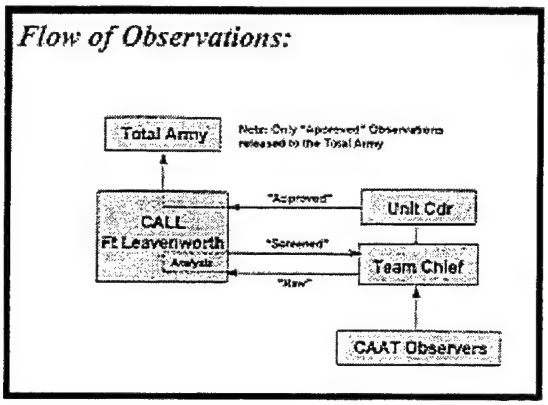
CALL collection teams are composed of eight to twelve expert personnel who are tasked from various units in the Army. The majority of personnel are pulled from the schoolhouses (TRADOCs) and are selected for a particular skill that is relevant to the knowledge being sought. (Henderson, 1998) The person in charge of the team will usually be a high ranking officer (O-5 or O-6) who is also tasked from the FORSCOM Army. To assist the collection team, CALL will provide three people, an Operations Officer (OPSO) to share responsibilities with the team leader, an Operations Non Commissioned Officer (OPSNCO), and a civilian analyst who is assigned to the team but remains at Leavenworth.

E. COLLECTION PROCESS



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Once the team is on station, the members join an army unit on patrol to observe and document events in real time. It is important to note that CALL observers are not evaluators. The CALL personnel are attached to the unit and become an integral part of the operation. (CALL, 97-13) They are there to support the unit as well as observe.

For collection purposes, the observed information must be operational or tactical in nature. Once a problem is identified, the CALL team follows it back to its source, looking to identify systematic problems, not temporary anomalies. (Henderson, 1998) After a patrol is finished, the observations will be verified with the mission commander and discussed further with the other observation teams members. The observations are then sent to an analyst at Fort Leavenworth for early feedback. The analyst will discuss it with other experts and send back either more questions or possible solutions.

F. INFORMATION TECHNOLOGY TO SUPPORT LESSONS LEARNED

1. Contingency Operations

CALL and CAAT teams effectively utilize IT for integrating new knowledge. Within days of arriving in Haiti, the CAAT teams were sending raw data back to the analyst via satellite at the rate of five to ten observations a day. (Henderson, 1998) These unprocessed observations were posted on various electronic bulletin boards and also electronically distributed to a network of appropriate specialists for feedback. This allowed better questions to be devised, and after discussion, reflection, and feedback, the new information was edited for inclusion into the electronic organizational memory, or what we know as the lessons learned database. (Henderson, 1998)

To supplement the observations, videotapes and descriptions of what happened were sent via regular mail. With these were diagrams of the events and what the observers noted were possible causes and consequences.

The team returned to Fort Leavenworth after two months of patrols in Haiti. A three-day meeting then took place, during which they went through the observations, deciding what lessons to publish in an "Initial Impressions" report. This report was then sent out to thousands of ground and replacement troops. (Henderson, 1998)

The team also produced over 100 vignettes of real world scenarios for replacement troops. These vignettes, along with videos of actual missions and the lessons learned information gained, were used to provide realistic training for replacement troops that was complete "right down to the barking dogs, rotting garbage, and belligerent

crowds." The presentation so closely approximated conditions the soldiers would encounter that CALL was credited with providing for a seamless troop transition as the 10th Mountain Division was replaced by the 25th Infantry Division troops. (Henderson, 1998)

2. Combat Training Center Operations

Contingency Operations are not the only scenarios that CALL monitors for lessons learned. Ongoing training is conducted practically every day. This enables Corps to Squad level Army units to fight a well-equipped and well-trained enemy in a variety of terrains that range from barren desert to densely vegetated woodlands. (CALL, 97-13) This training takes place at the Combat Training Centers (CTCs). It is at these CTCs that the most continuous sources of observations and lessons learned are generated, and under the most realistic of situations. CALL uses these exercises and lessons learned to provide three essential products to the rest of the Army: the CTC Quarterly Bulletin, the CTC Trends and the Topic Newsletter.

a. CTC Quarterly Bulletin

The CTC Quarterly Bulletin publishes articles on techniques and procedures that work. It is authored by current or former CTC Observers, and its audience is primarily units that are scheduled for a CTC rotation. (CALL, 97-13)

b. CTC Trends

(1) CTC Trends Bulletin. CALL receives trends and associated TTPs from all of the training centers on a regular basis. These are generated from unit rotations at the CTCs. The CTC branch of CALL organizes the trends and publishes a trends bulletin every six months. (CALL, 97-13)

(2) CTC Priority Trends Compendium. All of the recurring trends and associated TTPs for each CTC are compiled into a compendium of priority trends, which are published annually. The compendium also contains a matrix chart that shows the number of times per quarter that a particular trend was documented over the previous two or more years. (CALL, 97-13)

(3) CTC Trends Analysis. The CTC trend analysis is a two-part product. In the first part, for each CTC, CALL publishes a separate analytical review of each of the priority trends that were listed in the CTC Priority Trends Compendium. The second part is a cross CTC analysis of all CTCs. (CALL, 97-13)

c. Topic Newsletter

The Topic Newsletter picks a specific subject or issue. It then highlights the areas that are potential problems and finally provides useful tactics, techniques, and procedures to be used throughout the force.

G. INFORMATION SYSTEMS DIVISION

The Information Systems Division of CALL is the unit responsible for the facilitation of data collection, processing of observations, and dissemination of lessons

learned via CALL products. The primary IT tool used for this formulation of collection plans, categorizing of observations, and supplying of trend analysis is the CALL Collection and Observation Management System (CALLCOMS). CALLCOMS supplies the Army with an extremely effective process to automate the collection and analysis of lessons learned. Additionally, it provides training support packages tailored to specific units and publishes numerous periodicals that directly address the correction of mistakes for unit commanders and the total Army. An historical record of past trend analysis of NTC units is available to anyone with a desktop computer via the CALL homepage.

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VI. FINDINGS

A. INTRODUCTION

This section describes the research method and sources of archival data collected during research. An in-depth survey with a large population was beyond the scope of the thesis. Instead, an exploratory questionnaire was sent to a number of Naval Postgraduate School students who have recently returned from the fleet. This resulted in an extremely low number of usable results.

A request was also made to a small number of fleet units. The resultant response here, too, proved insufficient for analysis. In an effort to estimate the exposure of NLLS to the fleet, a different approach was undertaken. To obtain as wide a range of experience as possible, while being cognizant of the extremely low return rate, individual communities were specifically chosen to provide input for the survey. This was accomplished by soliciting various members of the targeted warfare specialties until an affirmative response was attained from a member of that community.

The questionnaire was divided into three sections. The first section covered the respondent's background, community, and experience. The second section was aimed at the Navy Lessons Learned Submission Process. Here, the questions were concerned with the respondent's knowledge of the NLLS and frequency of individual or command lessons learned submission. The final section covered the retrieval of prior lessons learned as well as the respondent's sense of the relative effectiveness of the system.

It is important to note the survey was not intended to be suggestive of a Navy-wide representation. Instead, it was designed to be a generalized, sample-based questionnaire specifically for the purpose of this research. In light of the data, it is recommended that a larger sample size survey be undertaken. All questions were asked in the past tense to reflect the time the respondents were in the fleet rather than stationed at the Naval Postgraduate School.

B. SAMPLE DEMOGRAPHICS

The sample candidates were individually chosen based on a community that they represented. The pool of respondents consisted of two Aviators, two Surface Warfare Officers, one Intelligence officer, one Submariner, one Medical Services Officer, and one Fleet Support Officer.

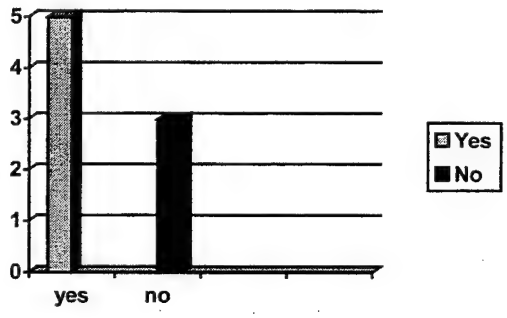
The respondent's rank ranged from a junior lieutenant to a senior lieutenant commander. Two of the respondents had prior enlistment time. The positions held while on sea duty covered a wide range of operations experience (Squadron Ops Officer, Combat Information Center Officer, Assistant Navigator, and Sub Pilot) as well as shore based IT related positions (ADP Officer and IT Project Officer). All but one had served aboard a ship, and those who had served aboard ship had made at least one deployment. Half of the replies came from personnel that had served onboard large decks (CVN or LPD). The average number of deployments of those who did serve aboard ship was two. The sample was composed of seven male and one female Naval Officers.

C. RESULTS AND DISCUSSION

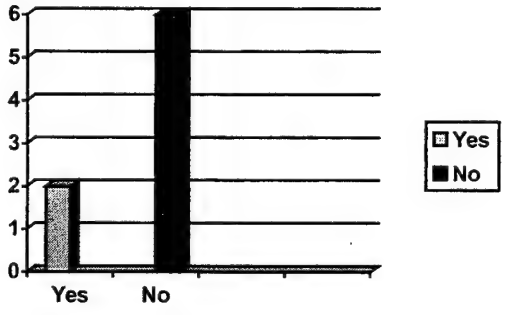
1. The Navy Lessons Learned Submission Process

a. Have you ever heard of the Navy Lessons Learned Center?

This first question was designed to get an overall feel for the respondent's knowledge of the NLLS in order to be able to more accurately draw conclusions from the rest of the survey. Of the eight, five, or 63 percent, had heard of NLLS. Two of the "no" answers came from aviators, and one from the submariner.

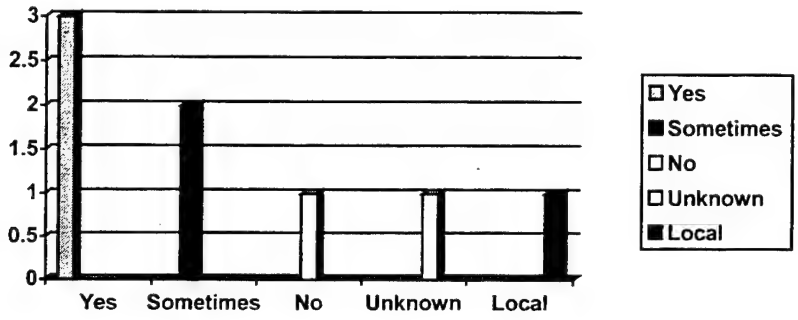


b. Did you know that the Navy Lessons Learned Center has a Web site with a database of all the Lessons Learned submitted in the past two years?



This second question was designed to assess the respondent's knowledge of the NLLS system. Whereas most people had heard of the system, only 25 percent knew about the Web site.

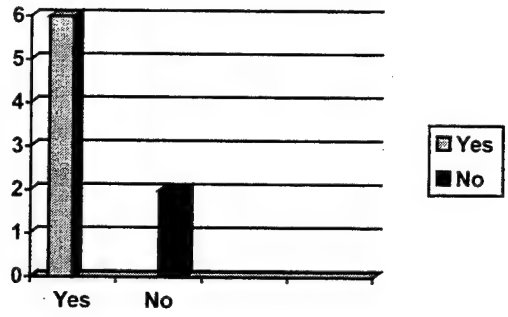
c. ***When your command concluded an exercise, were the lessons learned collected and forwarded to your ISIC?***



The majority of the respondents, or 75 percent, felt that lessons learned were being collected either all of the time or at least some of the time. There was one "no" answer, and that came from the Medical Services Officer.

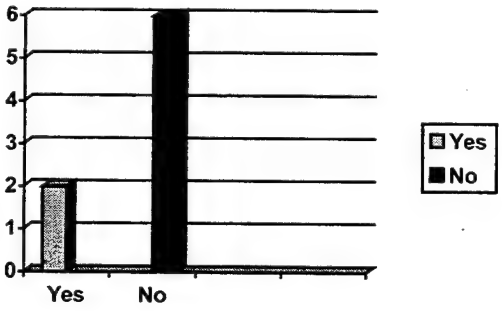
Breaking down the "yes" answers, three of the six collected lessons learned after every exercise, two of the six after most exercises, and one of the six collected lessons learned, but these were known to stay within the command (Fleet Support). The sole "unknown" response came from the Intel Officer.

d. During a scheduled exercise or evolution, was lessons learned collection given consideration?



The majority of respondents indicated that their commands gave lessons learned collection consideration during planning. The two negative responses were from the Intel Officer and the Medical Services Officer.

e. Did you consider submitting a NLLS report a worthwhile task?

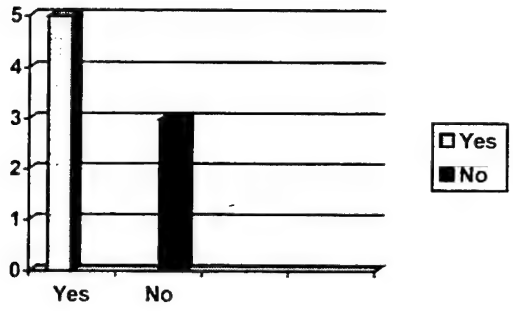


Almost every respondent had a pessimistic reaction toward the utility of submitting lessons learned. The two positive responses came from the Submariner and the Fleet Support Officer.

2. The Navy Lessons Learned Retrieval Process

The previous section revealed that almost everyone was either familiar with the lessons learned system or was a participant in submitting lessons learned. But organizational learning requires that knowledge gained by one member or unit be transferred to the other members. This section of the survey was aimed at determining if members were seeking out the knowledge that resided in nodes other than their own.

a. Did your department have access to the SIPRNET?



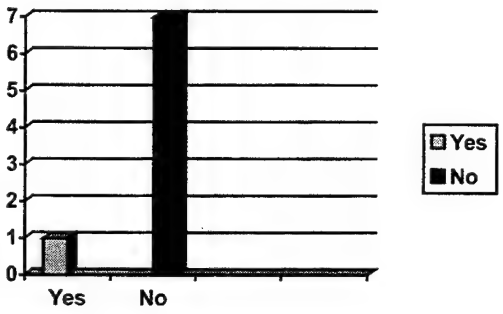
The most up-to-date lessons learned information can be accessed via the SIPRNET. In the event the service member does not have access to the SIPRNET, CD-ROMs with the same information are distributed on a quarterly basis.

This question is getting at two important issues, the ability to access the most current observations, and a means for providing a conduit to receive audio, video, or bulletin board information that can be used to enhance the recipient's understanding of the message.

Two of the three negative responses came from the Submariner and the Medical Services Officer. For the Submariner, the lack of SIPRNET is understandable.

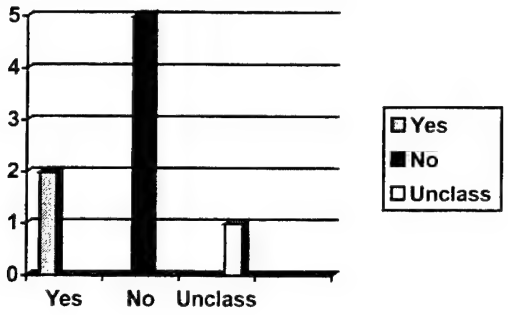
The MSO's lack of SIPRNET can most likely be attributed to that community's lack of secure need. The final negative response came from Aviator One. The ship he served on was non IT-21 compliant at the time.

b. Have you visited the NLLS web or SIPRNET site?



Only one of the eight had actually visited the NLLS Web or SIPRNET site. Because this positive response came from the Medical Services Officer, it was unexpected. In answering the previous question the MSO cited a lack of SIPRNET access. When queried about this response, the respondent indicated he had accessed the NLLS Internet Web site. The NLLS Internet Web site provides an overview of the system but does not contain actual lessons learned. It does provide information on how to access them via the SIPRNET as well as provide a means for inclusion on the CD-ROM distribution list.

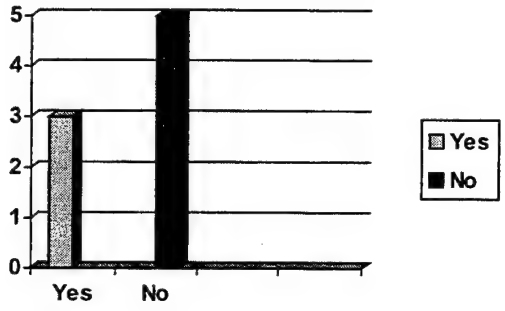
c. ***Did you have access to either the classified or unclassified Lessons Learned CD-ROM?***



Sixty-three percent responded that they did not have access to the NLLS CD-ROM. There were two affirmative answers from the Surface Warfare Officers, and the Medical Services Officer proffered the single unclassified answer.

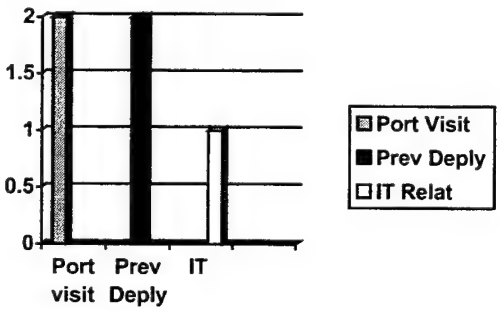
The high number of negative answers can most likely be attributed either to the way the question was asked or to a lack of respondents' knowledge of the availability of the CD-ROM. It is certain most ships receive the lessons learned CD-ROM at a department level. If the problem is a lack of knowledge of the CDs, increasing awareness may help to resolve this.

d. Have you searched the Lessons Learned Data Base for a Lessons Learned?



Most respondents answered "no" to this question. Of the three "yes" answers, two came from the Surface Warfare Officers and one from the Medical Services Officer.

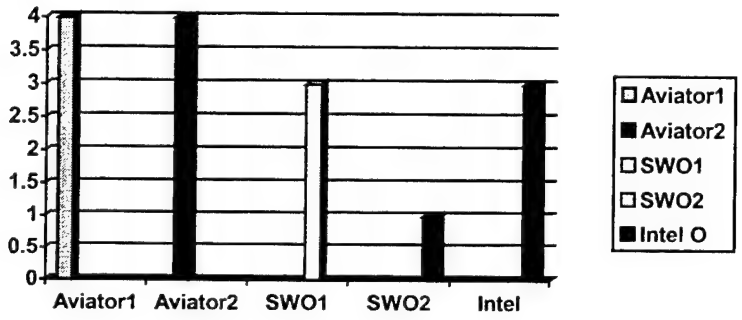
e. What type of Lessons Learned were you searching for (Previous exercise, similar exercise, port visit, etc.)?



This question garnered a high level of affirmative responses. Five out of the eight respondents reported accessing the database or, more correctly, a database. The two Surface Warfare Officers were looking for port visit lessons learned. The two Aviators, who previously answered negatively to searching the NLLS database, explained

they had searched or read Air Wing Lessons Learned information. The last response was from the Medical Services Officer, and he wrote he was searching for IT lessons learned.

f. ***On a scale of one to five, where one is of little use, three is of moderate use, and five is of exceptional use, rate the usefulness of prior lessons learned as they applied to you in a exercise or evolution.***

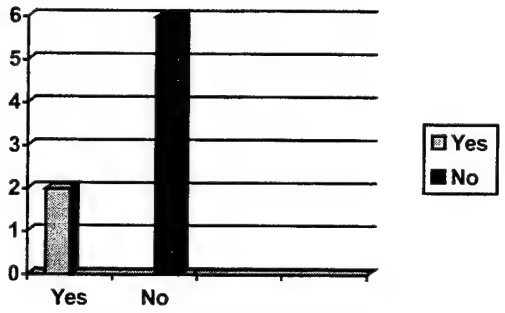


The aviators rated the usefulness of lessons learned fairly high, with both giving lessons learned research prior to an exercise a four. Both of the SWOs stated that they used it for port visit information, but one gave it a three, and the other responded with a rating of one. The last respondent, the Intel Officer, gave it a moderate three.

g. ***On an average of how many times a month did you access the lessons learned database?***

This question revealed that all participants very rarely accessed the database on a regular basis. One respondent (SWO) indicated that maybe in a good month he would access it twice, but for the remainder the answer was zero times or not applicable.

h. ***When your command prepared for an exercise, was the lessons learned database consulted during planning?***



This question resulted in two affirmative responses, one by a SWO and the second by the Submariner. However, in both cases, they clarified their responses and added that the lessons they consulted were on their own ship's database.

i. ***What type of circumstance would cause you to reference the lessons learned database?***

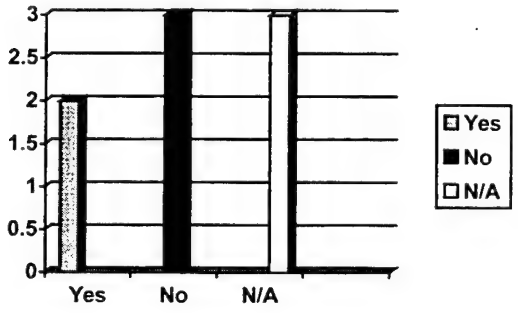
The modal response to this question was that a service member would access the lessons learned database if he or she was going to take part in or undertake an infrequent evolution. The Fleet Support Officer, Submarine Officer, and one of the Surface Warfare Officers expressed this feeling. Other common responses were that reference was made prior to an exercise, which was stated by the Intelligence and Medical Officers, and if the respondent believed there was corporate knowledge residing in the database, which was expressed by the two aviators.

3. NLLS Effectiveness

a. Did you consider reviewing the NLLS database prior to an exercise a worthwhile task?

The two respondents who answered "yes" to question eight of the retrieval process both answered "yes" to this one. Of the other six "no" or "not applicable" responses, four felt if they had known it was there, they would have felt it a worthwhile task. The two remaining answers were from the aviators who remarked that reading lessons learned prior to an exercise was very much exercise dependent. Typically each exercise tended to be pretty specific. After the exercise started, lessons learned were almost always read, either from previous missions or those put out during a squadron or ready room meeting.

b. Had referencing the Lessons Learned database resulted in a change in the way you would approach tactics, techniques, or procedures (TTP)?

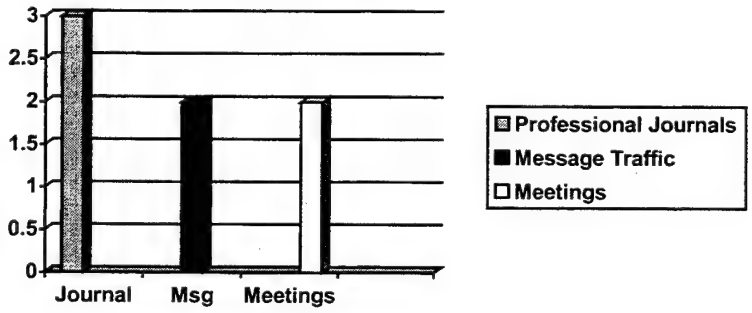


The two "yes" answers in this question came from the aviators, though both stated that they did not refer to NLLSDB Lessons Learned; it was Air Wing or Squadron Lessons Learned. Both stated that any change that resulted was either in

techniques or procedures. Tactics generally were developed during Air Wing training, and the exercises sought to improve on them.

Of the three "no" answers, two came from the Surface Warfare officers with no explanation, and one from the Submariner, who stated that if he had known it was there, it might have changed the way he would do something. The remaining three "not applicable" answers were from the Fleet Support, Intelligence, and Medical Services Officers.

c. ***Where would you say you received the majority of your lessons learned information?***



The responses received from this question can be grouped into three main themes: professional journals, message traffic, and meetings with people who shared corporate knowledge. Three out of the eight cited their community's periodicals (Approach or Fathom), which they read on a regular basis. Two who cited message traffic said it included mishap reports. And the final two cited either scheduling or planning conferences or the informal network of fellow co-workers as the source.

d. Do you have any inputs that you feel would make NLLS a more effective tool?

Four of the respondents felt NLLS would be a more effective tool if the awareness of the system could be improved. This conclusion can be anticipated in part because of their lack of knowledge of the system going into the survey.

One reply from a Surface Warfare Officer sought to make it more user friendly. He felt that writing each lesson learned took a tremendous of time, since it had to be dissected or parsed into rigid NLLS format (observation, recommendation, etc).

The remaining three provided no input to improve the product.

D. ARCHIVAL DATA RESEARCH

1. Introduction

As part of this research, an analysis was conducted to determine the feedback generated from one of the most strenuous levels of training encountered during a battlegroup's preparation for deployment, the Joint Task Force Exercise. (JTFEX)

2. Background

Following a deployment, ships usually enter into a planned maintenance and upgrade yard period. Upon completion of this yard period, the ship will once again rejoin the fleet returning to sea. These first few at-sea periods consist of individual or unit level training. Following this phase, the ship will undergo an extremely high intensity integrated, underway and inport interdployment workup cycle (IDTC) that culminates in a

certification exercise called the Joint Task Force Exercise. Throughout this exercise the Carrier Battle Groups (CVBG) and Amphibious Ready Groups (ARG) are presented with a scenario that emphasizes expeditionary warfare in a joint littoral environment. These exercises, which can involve many thousands of personnel, present increasingly complex scenarios to the participants.

For example, during JTFEX 99-1, more than 24,000 U.S., Joint, and Allied service members were involved in exercises that took place from the coast of Virginia to the Islands of Puerto Rico. In addition to the Army, Navy, Air Force, and Marine forces, elements from Great Britain, the Netherlands, France, Belgium, Canada, Germany, and Bolivia participated. The JTFEX is designed to provide realistic training to fully prepare the ships and personnel for any and all operations they may encounter when deployed. The participants train using equipment and systems that represent the latest advances in technology. During these exercises forces are tested on their ability to deploy rapidly, conduct joint operations, and refine tactics, techniques, and procedures. (http://www.chinfo.navy.mil/) JTFEX's have been called graduate level training for the battle groups, and successful completion is required prior to being certified ready to deploy.

3. Methodology

To provide input, a search of the Navy Lessons Learned Data Base was conducted for the last two years of observations. This resulted in returns for five Joint Task Force Exercises. The following three data points were investigated:

- Total number of lessons learned for the exercise.
- Time required to validate the lesson learned.
- Outcome resulting from the lesson learned submission.

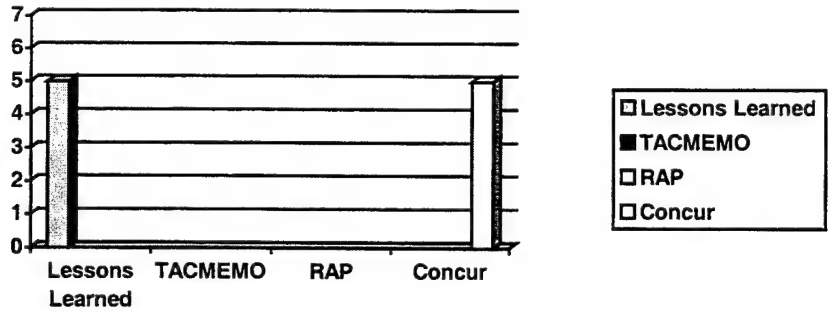
These outcomes were categorized into four classifications. The lesson learned submission could result in a Tactical Development Evaluation update (TACMEMO), Remedial Action Program (RAP) working group submission, "disagree" with the observation, or be delineated by either no remarks or "concur" with the writers' observation. In both of these latter cases, the outcome was classified as "concur."

The significance of the four categories is marked by what further action the lesson learned generates. A TACMEMO update can result in a change to existing doctrine, tactics, techniques, or procedures currently in place. A RAP item identifies a deficiency in policy, organization, training, education, or equipment. In both of these cases the knowledge gained from the lesson learned will be promulgated throughout the organization in the form of new publications, doctrine, or equipment.

In the case of a lesson learned classified as "concur" or no comments noted, for this knowledge to be disseminated, the organization's members have to actively search the database.

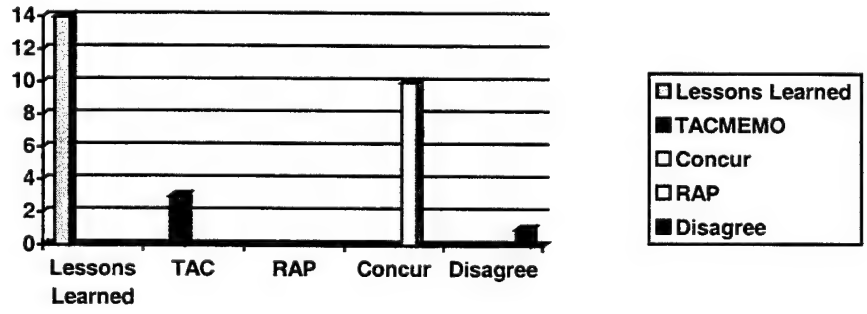
4. Results

a. JTFEX 98-1



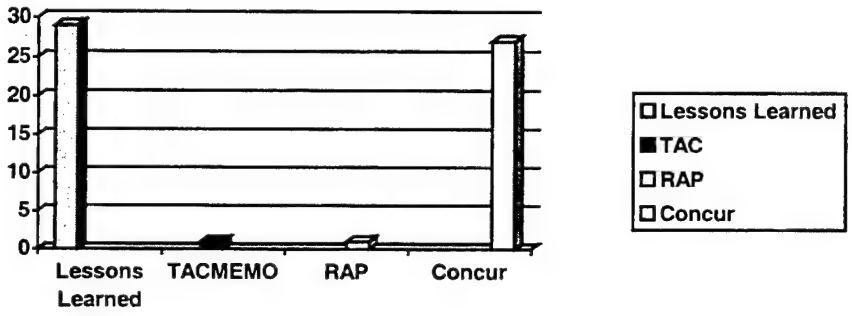
The first JTFEX took place from January 12th to February 4th of 1998. JTFEX 98-1 consisted of the USS John C. Stennis Battlegroup (CVBG) and the USS Wasp Amphibious Readiness Group (ARG). The lessons learned for JTFEX 98-1 consist of five entries. Validation for these five entries took four months, and the outcome for all five is classified as "concur."

b. JTFEX 98-2



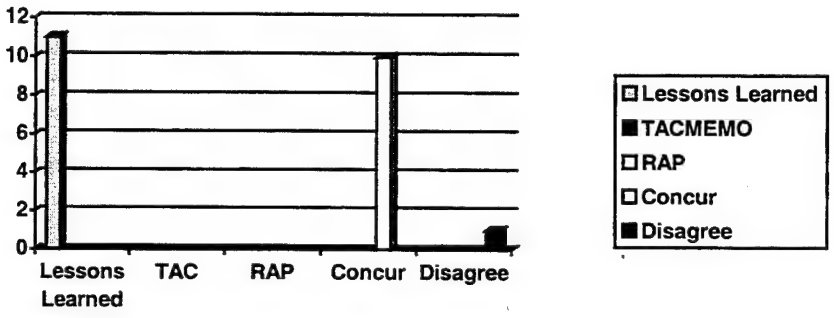
JTFEX 98-2 was held from April 27th through May 13th. It consisted of the USS Dwight D. Eisenhower Battlegroup and the USS Saipan Amphibious Readiness Group. The lessons learned for JTFEX 98-2 consisted of 14 observations. Validation for these observations took five months and the outcome consisted of three TACMEMOS, ten "concur," and one "disagree."

c. JTFEX 99-1



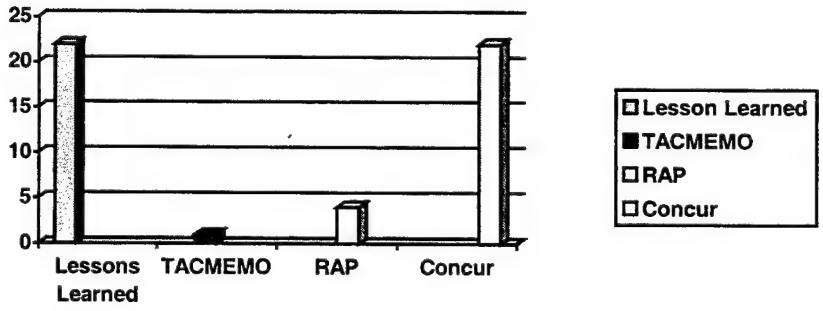
JTFEX 99-1 took place from February 12th until March 7th. Taking part were the USS Theodore Roosevelt Battlegroup and the USS Kearsarge Amphibious Readiness Group. The lessons learned for JTFEX 99-1 consisted of 29 observations. Validation for these observations took four months and the outcome consisted of one TACMEMO, one RAP, and 27 "concur."

d. JTFEX 99-2



JTFEX 99-2 was held from July 18th through July 30th. Taking part in it were the USS John F. Kennedy Battlegroup and the USS Bataan Amphibious Readiness Group. The lessons learned for JTFEX 99-2 consisted of 11 observations. Validation for these observations took two months, and the outcome consisted of ten "concur" and one "disagree."

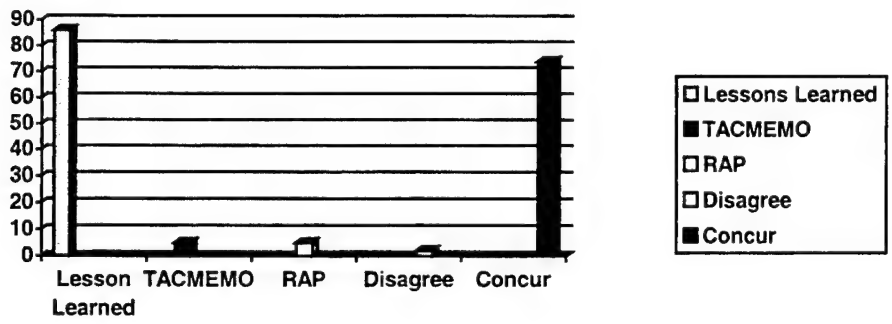
e. JTFEX 00-2



JTFEX 00-2 took place from May 10th until May 20th. The USS George Washington led the carrier battle group, and the USS Saipan led the Amphibious Readiness Group. The lessons learned for JTFEX 00-2 consisted of 27 observations.

Validation for these observations took seven months, and the outcome consisted of one TACMEMO, four RAP items, and 22 concurs.

f. Overall



Overall for the five Joint Task Force Exercises, there were 86 Lessons Learned in the database. From these 86 observations, five TACMEMOSs and five RAP items resulted. Of the remaining 76 observations, two were classified as "disagree" and 74 "concur."

VII. ANALYSIS

A. INTRODUCTION

The goal of this section is to provide analysis of the Navy Lessons Learned System to determine if Organizational Learning is taking place. Using the theories of Huber, Argyris and Schön, and Fiol and Lyles as a basis for exploration, we examine whether there are systems in place that encourage and enable learning. In addition, emphasis is placed on examining the results of the sample survey to see if there are cultural or environmental factors whose effects could result in rendering even a well-designed information system ineffective.

B. IS ORGANIZATIONAL LEARNING TAKING PLACE?

1. Introduction

This analysis uses a framework adapted from a Department of the Navy model that presents the requirements for a balanced knowledge management approach. (Navigating the World of Knowledge, 2000) This model states that balance is required to ensure that undue emphasis is not placed on any one single aspect of management. It contends that technology alone is not sufficient for knowledge transfer. The behavior of people must be changed, and they must be provided with the tools to use the technology. (Navigating the World of Knowledge, 2000) The framework comprises five separate but equally important pieces: Content, Process, Culture, Learning, and Technology. Using

this as a framework provides us with a useful platform from which to analyze the organizational learning models discussed earlier with the Navy Lessons Learned System.

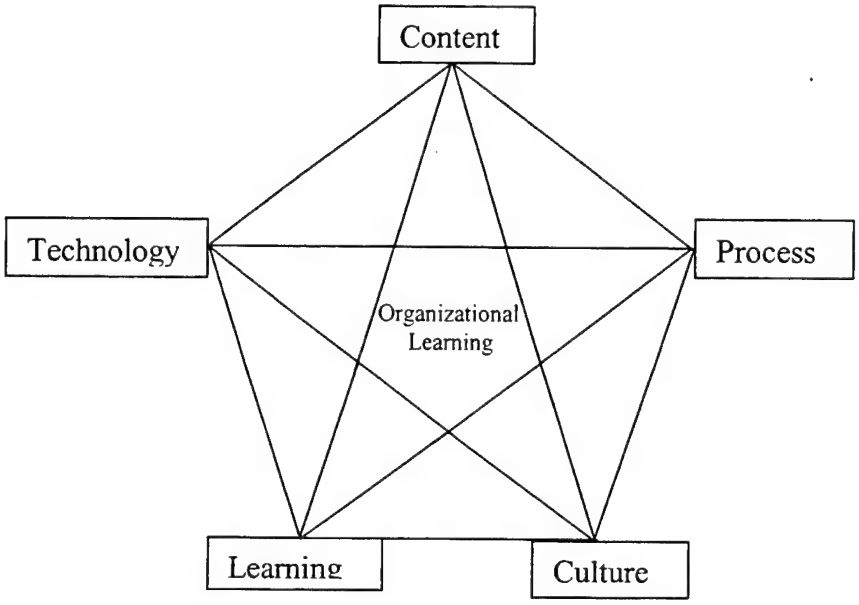


Figure 2. Organizational Learning Model

2. Content

Organizational Learning begins at Content. For the NLLS system this content manifests itself in the database of lessons learned. As we have seen, content is made up of much more than a flat file of information. For lessons learned to be credible, the content must be timely, relevant, and provide value for the user.

For our purpose, timeliness of the information relates to how long it takes for the information or knowledge gained by one unit to be shared throughout the organization.

What is timely also can depend on the urgency of the situation or the significance of the lesson learned. If a ship is engaged in hostilities, any delay in sharing information may result in losses. If the ship is tied up to the pier, the applicability of the knowledge may not be apparent or needed for many months.

For the research done on Joint Task Force Exercises, the Navy Lessons Learned System's average time from submission to publication was a little under four and a half months. For organizations that do not have SIPRNET access and rely on the next CD-ROM distribution, an additional three months might be necessary. JTFEXs are held approximately every five months. In this instance, getting the information from the previous battlegroup experiences in time for preparations and planning may not occur.

Relevance and value are closely related. Relevance can be thought of as the applicability of the information to the individual's daily routine or task carried out. Value is the benefit the individual receives from accessing this information. The value of the information can diminish with the increased time required to obtain it.

A frequent comment heard when discussing lessons learned has to do with the relevance or applicability of the information to the individual. The database comprises approximately 24,000 lessons learned. It is apparent from the research done on the JTFEXs that most lessons learned are very specific in nature, and the applicability for other individuals would appear to be very low. There are full text search engines available to look for certain topics in the database, but if the intention is to get an overall impression of the exercise prior to undertaking it, the information is generally too specific

to be of use. The reason for this becomes evident as one searches through the information.

The JTFEX database comprises 86 observations, and the complete NLLS database is approximately 24,000 lessons learned. But most of these observations consist of a sample size of one, which presents individuals and analysts with difficulties in determining how valuable the knowledge might be. Most of these observations lack the richness or breadth needed to provide a wide increase in organizational knowledge. On the other hand, some events provide a wealth of information that is applicable organizational wide. A recent example is the bombing of the USS Cole and the lessons learned that could be gained from that ship's experiences refueling in a foreign port.

On a somewhat smaller scale are the lessons learned with every aircraft mishap or ship's collision. In any of these instances trained investigators are dispatched to examine events that led up to the incident. From their analysis, significant lessons learned are written up and disseminated to the fleet. When the sample size of one consists of something as rich as an aircraft or ship mishap, the relevance to every aircrew or Officer of the Deck is apparent. The value is much less apparent when searching through a large numbers of specific instances for one that may be relevant.

3. Technology and Process

In Huber's work the role of technology in organizational learning was explicitly specified as benefiting Organizational Memory. He stated that the hard information of a

company was resident in computer memories with the soft information and the ability to pass this on residing in the members. (Huber, 1991)

With the far-reaching effects of the Internet, today's technology can have a profound effect on not only Organizational Memory, as Huber theorized, but on the other three processes of learning, Knowledge Acquisition, Information Interpretation, and Information Distribution, thus dramatically increasing a member's ability to pass this knowledge throughout the organization.

a. Knowledge Acquisition

Knowledge Acquisition is facilitated by NLLS when available technologies (Web based gateways) are used to scan the environment (NLLSDB) for information retrieval. For the military members using NLLS, this is a closed system, as the learning that occurs comes from within the organization.

Knowledge Acquisition also can emerge from the revision of existing doctrine or innovations in strategy that result from inputs to the system. TACMEMO publications and RAP item submissions are the best examples of this.

Lessons learned also have shown themselves to be generators of "Best Practices" that are considered to be superior in approach and results. Usually Best Practices represent SME experiences, but they also have been based on inputs from the fleet or research conducted in response to an observation.

b. Information Distribution

Information Distribution is the process by which an organization shares its information among its members, thereby promoting knowledge. For the NLLS system this is accomplished in two parts. The first is the distribution by either the quarterly circulation of the CD-ROM database or the weekly updating of the SIPRNET database. The second is the accessing of the web site by members.

The Navy Lessons Learned Organization information distribution process takes the *Field of Dreams* approach, the "If you build it, they will come" mindset. But relying solely on this approach is risky. Based on information provided by NWDC, during the period of May to October of 2000 the total number of lessons learned accessed, excluding port visits and RAP items, was 27,819. This breaks down to approximately 4,600 hits a month. For the research on the Joint Task Force Exercises, I accessed 86 lessons learned. In the fleet the average number of lessons learned searched is unknown but would probably be closer to twenty per person. Twenty lessons learned accessed per person, per visit, divided by the 4,600 hits, would mean that approximately 230 people a month visited the site. Since the majority of the information contained in the database is only provided if the user accesses the site, there is a minimal amount of Information Distribution occurring, even though the technology allows all members access.

c. Information Interpretation

Process in this framework is the means by which the organization captures, categorizes, and presents information. As important as capturing the

information is, capturing the context is even more so. Huber talks about this as Information Interpretation, or the manner by which distributed information can be given one or more commonly understood meanings. (Huber, 1991) Context is unique at any point in time, and a change in context can result in completely different interpretations between individuals. These interpretations may be subject to changing environment, recent events that have transpired, or even interactions between crew members on a ship. A knowledge base of lessons learned is particularly sensitive to the difference in context that exists between the sender of the message and the receiver. Using the Joint Task Force Exercises as an example, a particular lesson learned has behind it a host of conditions that may or may not be applicable or apparent to the receiver. Everything from different equipment configurations onboard ship to battlegroup composition challenges the relevancy and comprehension of the intended meaning to another individual.

Compounding this difficulty, the lessons learned layout consists of a four-paragraph text only format. These paragraphs are broken down into an Observation, Discussion, Lesson Learned, and Comments section. To give the intended meaning a greater chance of being understood, Information Technology can be used as a way to enrich the message. Providing an opportunity to include drawings, diagrams, or documentation in a PDF format may make the information more understandable. Anyone who has tried to program a VCR understands the benefits of diagrams that are used to supplement the instructions.

To increase the breadth of lesson learned applicability, Information Technology can also be used to cluster or bring together data and information that is

similar or related. Clustering – for example, on a keyword search – would allow the user the ability to compare and contrast information from a variety of sources around a subject or topic area. Even if the lesson learned is not applicable, or the search returns without a match, there may be valued gained.

4. Learning

a. Individual vs. Organizational

To assess NLLS effectiveness on learning, individual learning must be separated from organizational learning. Individual learning involves the detection and correction of errors. It can consist of single loop or double loop learning. In single loop learning, members of the organization respond to environmental changes by detecting and correcting errors in ways that allow the organization to continue with its present policies. In double loop learning, the error is detected and corrected in ways that involve the modification of the organization's underlying norms, policies, and objectives. (Argyris and Schön, 1978) Learning at an individual level, however, remains within the party or unit that created it.

Organizational learning occurs when members of the organization share their memories, associations, or experiences. Sharing can be done by traditional methods, such as meetings and memorandums, or it can be done by computer-generated means such as e-mail, electronic bulletin board, or file downloads. This organizational learning is influenced by many factors, such as structure, strategy, environment, technology, and culture. (Fiol and Lyles, 1985) Organizational learning occurs with the acquisition and

transfer of knowledge, and it reveals itself when the organization modifies its behavior to reflect this new knowledge. (Garvin, 1993)

Although learning remains essentially the same in the individual case as in the organizational case, the learning process is fundamentally different at the organizational level. (Kim, 1993) When we talk about organizational learning, we are concerned with conveying knowledge from one person to the next.

b. NLLS Effect on Organizational Learning

To evaluate NLLS effect on organizational learning, one has to look at the individual's usage of the system. Usage in this instance is defined by an individual submitting a lesson learned to distribute newfound knowledge, or by an individual accessing the information to increase the breadth of the organization's knowledge base. It is not possible to accurately evaluate the number of times that CD-ROMs are used to search the database. Instead, this opinion is based on the research data and information provided by the Web site.

Overall, the sample survey and Web counter information indicate a very low rate of accessing the NLLS database by military members. Looking at inputs to the system, it's important to remember that the database contains only those lessons learned forwarded by the individual's Immediate Superior In Command (ISIC), not the total number of actual submissions that may have been received after an exercise. That said, for the five Joint Task Force exercises, which can involve up to 20,000 participants each, the average number of lessons learned generated is 17 per exercise.

For organizational learning to occur through the NLLS system, active participation by individual members is required. The NLLS system relies on a passive collection method and an active distribution method. Inputs are generated from individuals in the fleet. Once these observations are validated, CD-ROMs are distributed and the NLLSDB is updated. To complete the dissemination of knowledge, members must actively pull the information from the database.

Currently, the Navy Lessons Learned System provides an extremely efficient way to promote organizational learning with the automation of submission and validation of lessons learned. However, the effectiveness of organizational learning suffers from the poor response rate or participation rate by members of all communities. To demonstrate organizational learning, "that which is stored in organizational memory must be brought forth from memory". (Huber, 1991) This poor response rate inhibits the communication of new approaches or success stories gained from within the organization. Without greater involvement, formalizing the process of transferring best practices and lessons learned is not going to result in new discoveries or solutions being leveraged off existing ones.

5. Culture

Lessons learned collection has become synonymous with exercise completion. All too often it is given perfunctory thought, and the only reason inputs are generated is that they are mandated for after-action reports or required from the chain of command. More significant, even this obligatory emphasis placed on lessons learned collection is rarely

placed on lessons learned research prior to an exercise. The reasons can vary, but the research is often seen as an inefficient use of time by personnel undertaking an assignment or planning an operation. Frequent comments echoing this came from members who stated that they experienced a lack of benefit from the effort expended. For the NLLS system the greatest hindrance was in the lack of exposure most people had to the database. Still, it is not certain that with greater exposure the response rate would have fared much better. The small number of lessons learned generated from the five Joint Task Force Exercises indicates there is a fundamental culture present in the Navy that reduces lessons learned submission and hampers NLLS ability to promote Organizational Learning. This culture may be based in part on the mindset seen in Knowing Organizations, an attitude that hinders the learning organization's culture of "openness to experience, encouragement of risk taking, and willingness to acknowledge failure." (McGill and Slocum, 1994)

The Knowing Organization is a model advanced by M. E. McGill and J. W. Slocum that can be seen in operation in virtually every franchise operation in the United States today. In a Knowing Organization, there is a belief that there is only one best way to complete a task, manage an employee, or structure the organization.

> *"Undoubtedly the most famous and visible of all knowing organizations is McDonald's. Its 13,000 plus stores exemplify the best of what a knowing organization has to offer: efficiency, predictability, and control in production and customer services." (McGill and Slocum, 1994)*

The best way to fry a hamburger, or how long the french fries should be cooked in oil, has been discovered and is committed to the organizational memory. A Knowing Organization focuses on "standardized policies, procedures, rules, and regulations." (McGill and Slocum, 1994; Hannah, 1993) Knowing Organizations take their strength from the high levels of conformity and standard operating procedures that form a very effective organization as long as the environment remains relatively stable.

In times of change, the Knowing Organization may make "incremental changes to existing processes but these are really only tweakings and fine tunings of what the organization already does." (McGill and Slocum, 1993; Hannah, 1993) In a Knowing Organization, managers develop practices over time that protect the organization from pressures and outside influences, whatever their merit. "Rituals, stories, jargon, and physical settings are all instruments that can hinder their ability to detect and develop the mechanisms that learning requires." It is because of this that McGill and Slocum believe Knowing Organizations are "learning disadvantaged." (McGill and Slocum, 1993; Hannah, 1993)

Lessons learned are often not written because we use the established doctrine and standard procedures. Doctrine says how to assault a beach, so we plan and execute according to doctrine. If a lesson learned is written, it tends to deal with communication issues, circuit management, or even the benefits of e-mail, something that may have great applicability to the ship involved at the time, but marginal utility to the next battlegroup.

Small incremental changes to existing process mark the sign of a Knowing Organization. The lessons learned resulting from Joint Task Force Exercises should be

initiatives on the scale of, "How many strike aircraft do we need to accomplish this mission" Instead, they point out that a ship may need a reservist to help sort incoming messages.

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VIII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The Navy's Lessons Learned Program has undergone significant and noteworthy changes since its establishment in 1991. Today, the organization fully meets its objective of providing the Navy with a "low-cost database system to collate, evaluate, and disseminate Navy specific lessons learned." (OPNAVINST 3500.37B)

Though it meets its purpose, the author believes there is still room for improvement. These improvements can be characterized by either approach or processes, with specific suggestions covered in the Recommendations section.

1. Approach

As technologies and operations evolve, there is little disagreement with the increasingly important need to capture, record, and disseminate lessons learned. However, the goal should not be to obtain as many lessons learned as possible. The volume of the database is not nearly as important as the quality of the information. The Navy Lesson Learned System's focus should be enabling Knowledge Creation, not Knowledge Recording. The ultimate goal should be establishing a Knowledge Management System that oversees the creating, securing, capturing, coordinating, combining, retrieving, and distribution of knowledge. (Liebowitz, 2000)

NLLS and Doctrine Department are in a unique position to manage the knowledge environment at an organizational level. Learning lessons once is an underlying

aim; providing the right information to the right person at the right time is the goal. Many organizations, the Navy included, are drowning in information and starving for knowledge. Targeted lessons collection, specific knowledge creation, and active knowledge dissemination should be the objective of the NLLS system as the Navy enters the 21st century.

2. Process

The Navy Lessons Learned System is implementing a Knowledge Attic approach. Lessons learned are collected by passive means, validated by active means, but stored and disseminated by passive means. The organization does not play an active enough role in determining and targeting what it feels are the areas the military most needs to improve. Additionally, appropriate lessons learned are not sent to the individuals in the organization who would find these lessons to be of the greatest value. Critical elements for advancing the organizational intelligence are identifying individual learning, passing it on, and creating organizational learning.

Background research indicates that at almost every level in the organization, lessons learned are being collected and disseminated, but to varying degrees and on various levels. Whether it is the trouble-shooting procedures developed in the avionics shop, or an end-of-cruise report prepared by a fighter squadron, there are varying degrees of utility these lessons have to other members in the military. Information Technology has reduced the delay previously encountered in collecting and submitting lessons learned but has resulted in stove-piping of this information among various units or staffs within

the organization. Increased emphasis on networking should be used to bring together these multiple bodies of explicit knowledge that exist. By streamlining requirements to validate lessons learned and in some cases dropping them all together, NLLS can accelerate the process of turning individual learning into organizational learning. Observations concerning tactics, techniques, or procedures will still require formalized methodology for validation, but there are various other lessons learned that do not. Knowledge enablers consisting of Web-based turnover pages or bulletin board discussion areas for Operations Officers would foster organizational learning and allow incoming units a chance to more quickly assume their operational mode.

B. RECOMMENDATIONS

1. Target the User

NLLS's most important step should be to undertake a more through survey to accurately assess who the customer is. The sample questionnaire identified a lack of exposure to the system by most of the respondents. By more precisely identifying the customer, NLLS can focus awareness of the system to that population and work to ensure the process meets their needs.

2. Pull the Relevant Information

The Navy Lessons Learned System relies on a passive collection method. The consequence of this is inputs of large volumes of data, from whatever source is available, without thought or consideration to defining an overall collection plan. Each observation

requires investigation by a Subject Matter Expert regardless of the relevant overall benefit to the organization. The end result is a wide-ranging database of discrete facts that took many man-hours to complete and is difficult to analyze. Passive collection does have a place in NLLS as an enabler of input from all levels of the organization. However, targeting the focus of collection would provide greater benefit to the organization as a whole.

Active collection entails a coordinated effort to try to identify solutions to existing problems or issues identified by a sponsor. This issue can result from training exercises or from shortcomings identified in actual operations. Other sources could be analysts, instructors, doctrine writers, or commanders in the field. (Tulak, 1999) The environment should be scanned for emerging trends or issues as well as ongoing operations examined for possible future ramifications. The Early Bird can provide a good starting point for topics currently rising in prominence. (Tulak, 1999)

Active collection options can range from training evaluators to act as observers to identifying and targeting certain learning objectives. Warfare specialists or the Executive Steering Committee can identify these learning objectives, and they may change over time. Possible examples in the aviation world would be to track Blue on Blue incidents or target acquisitions rates during JTFEXs. In the case of target acquisition, metrics would be developed to identify reasons the aircrew failed to acquire a target. Data points could include weather, equipment failure, or training. From this information, trends would be readily identifiable that may help to improve target acquisition or identify shortcomings in training syllabi. Measured performance almost always improves.

Cost is always an issue, but specific exercises could be targeted for trained observers based on their rising importance, emerging trends, or high visibility. JTFEX 00-1 provides us with an example.

Because of the political situation in Puerto Rico, the USS Dwight D. Eisenhower Battlegroup was unable to conduct live naval surface fire support (NSFS) training, live fire air to ground training, or combined arms training on the Island of Vieques. Efforts were made to reschedule, cancel, or move portions of the training to alternate countries while on deployment. Lessons learned from this exercise would have been particularly valuable for follow-on battlegroups in the event they encountered the same circumstances. As important as collecting Eisenhower's lessons learned would be analyzing her trends on deployment due to missed critical training during workups.

Recent decisions by the governor of Puerto Rico have resulted in the halt of training on the Island of Vieques for the USS Enterprise Battlegroup and the USS Kearsarge Amphibious Ready Group. With the Enterprise scheduled to deploy in late April, Air Wing Commanders and ship Commanding Officers may be scrambling to locate alternate training sites to ensure the readiness of their people. Unfortunately, they will not be able to gain benefit from the Eisenhower's experiences. Because of what some people believe was either low submission rates or the poor quality of lessons learned generated from JTFEX 00-1, the CINCLANTFLT Fleet Management Site has yet to receive this information to include in the database. Trained observers would have helped in this case, and the lessons learned could have been used to provide assessment for upcoming policy decisions on the future of Vieques.

3. Push Information to the Users

A common suggestion to improve NLLS was to increase awareness of the system. One method of accomplishing this would be to publish a quarterly newsletter or bulletin. Success stories and best practices could be solicited from fleet units, and articles that are published should garner the ship points in the yearly Battle "E" competition.

An alternative method would be to provide a Top Ten list with a short description of the observation for inclusion into already established publications like Fathom or Approach. The article would let the reader know where to go to get further information. For ships scheduled to undergo JTFEX, or getting ready to go on deployment, briefing packages of recent trends noted could be provided. Inputs for these trends could be provided by the various SMEs who see the lessons learned on a daily basis and targeted by class of ship or area of deployment.

Finally, unclassified lessons learned should be made available over the Internet to those users who have a .mil extension. A link could be posted on the Navy homepage along with information about the site. Each of these suggestions may provide incentives to use NLLS as well as promote the system to users throughout the fleet.

4. Categorize by Community

One difficulty noted while researching the NLLSDB arose from the way in which the information was organized. The data is currently grouped under the operations name. Noble Shirley, Juniper Stallion, or Fortress Raptor are a few examples. Unless the user is familiar with the exercise, extensive time may be spent searching for comparable

situations. There is some benefit to this structure; however, an alternate framework for arranging or categorizing the information and knowledge should be used that enables people to find and use it more effectively.

A simple sort function that allows the user to group observations by topic or community would be helpful. Instead of being grouped by exercise name, they could be grouped under *Missions* with subheadings of Humanitarian Assistance, Noncombatant Evacuation, or Foreign Disaster Relief. *Operations* could have subheadings of Civil, Interagency, Multinational, or Combat. Further headings could include sections based on *Communications*, *Command and Control*, or *Intelligence.* Organizing the information by platform or community is one way to facilitate knowledge flow.

5. Networking and Resourcing

The NLLS Organization with the help of the Fleet Management Sites could provide a critical role as system intermediaries, responsible for connecting people to the information they require. The various Fleet Management Sites already have a strong familiarity with how to locate information or expertise in the organization quickly and efficiently. Using this experience a Yellow Page Directory, mapping knowledge areas to experts within the organization, could be provided.

C. SUGGESTIONS FOR FURTHER STUDY

This exploratory study has only begun to uncover the growing role and effect that Information Technology will have on Organizational Learning. The explosion of the Internet, with all of its benefits and all of its drawbacks, is in its infancy in the military

and will continue to amaze and frustrate the men and women who serve on board ships in the near future.

Further areas of study in Organizational Learning would include examining the possibility of Web-based turnover pages that would allow the oncoming aircraft carrier, as it transits the Atlantic or Pacific Ocean, to take part in the strike planning or shipboard operations that will be expected of it once it is on station. Examining the role and implications that communities of practice "chat rooms" will have on breaking down traditional boundaries and allowing the free flow of information between the organization and the environment as they are set up between ships or even battlegroups is another. Along with this, a question must be answered: Is lateral communication a threat to good order and discipline, blurring the lines between traditional structures and the chain of command that is in place?

Other questions include what sort of expert or decisions support systems the Naval Officer of tomorrow will require to deal with the data deluge of information that is surely going to take place. Lastly, as our reliance on Information Technology grows, will the bandwidth that is available on board ship keep pace, or will it place limitations between ships in the battlegroup, creating a digital Darwinism between the haves and the have-nots, leaving the smaller ships out of the technological loop of information?

APPENDIX A. SURVEY INSTRUMENT

Navy Lessons Learned System (NLLS) Questionnaire

[Thank you for agreeing to take time to answers some questions. I am examining the Navy Lessons Learned System and its impact on organizational learning. I am conducting this research for my Master Thesis at the Naval Postgraduate School. This questionnaire will address three primary topics concerning the Navy Lessons Learned system: the submission process, the lessons learned retrieval process, and the effect the NLLS system had on the way you planned or approached a scheduled training exercise. The information I collect will be strictly confidential and your name will not be used in any way. I appreciate your taking the time to fill this out and would welcome any additional comments you have on the system]

Background

1. What is your rank and designator?

2. What positions have you held while on sea duty?

3. What platforms did you serve on?

4. Did you make any deployments while onboard, if so how many?

Lessons Learned Submission

1. Have you ever heard of the Navy Lessons Learned Center?

2. Did you know that the Navy Lessons Learned Center has a Web site with an active database of all the lessons learned submitted in the last two years?

3. When your command concluded an exercise were the lessons learned collected and forwarded to your ISIC?

4. During a scheduled exercise or evolution, was lessons learned collection given consideration?

5. Did you consider submitting a NLLS report a worthwhile task?

Lessons Learned Retrieval

1. Did your department have access to the SIPRNET?

2. Have you visited the NLLS Web or SIPRNET site?

3. Did you have access to either the classified or unclassified lessons learned CD-ROM?

4. Have you searched the database for a lesson learned?

5. What type of lesson learned were you searching for?

6. On a scale of one to five, where one is of little use, three is of moderate use, and five is of exceptional use, rate the usefulness of prior lessons learned as it applied to you in an exercise or evolution.

7. On average how many times a month did you access the lessons learned database?

8. When your command prepared for an exercise, was the lessons learned database consulted during planning?

9. Did you consider reviewing the NLLS database prior to an exercise a worthwhile task, if not why?

10. What type of circumstance would cause you to reference the lessons learned database?

11. Had referencing the NLLS database resulted in a change in the way you would approach tactics, techniques, or procedures (TTP)?

12. Where would you say you receive the majority of lesson learned information?

13. Do you have any inputs that you feel would make the NLLS a more effective tool?

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